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Must Tramways Go?

The case for the trolley bus

THE Manchester City Council's decision to postpone final judgment on its Transport Committee's proposal to abolish tramways in favour of a large number of motor buses and a few trolley buses gives the electrical industry an opportunity of pressing the case of the trolley bus.

The storm aroused by the Committee's proposal again brings up some problems of national interest relating to urban and suburban transport. The principal questions appear to be: "Is the tramway obsolescent and should the process of elimination be hastened?" Even if the first point is answered affirmatively, as it probably will be, the second requires very careful consideration. In many towns the tramways are a substantial "vested interest." Large sums have been expended on them and there are heavy outstanding debts. Should not the trams be retained at least until they have redeemed the bulk of their cost? But can they do this if they are not modernised from time to time, by the expenditure of further capital, thus forcing them endlessly to chase their tails?

These matters have no doubt received due consideration from the Manchester Transport Committee for it decided to proceed with the gradual scrapping of the trams some time ago. The trouble has been over a further proposal to speed up the process, owing to the necessity for extensive track renewals, and substitute, in the main, oil-engined buses; the Committee proposed to purchase 337 motor buses and only 91 trolley buses. A section of the Council and of the Manchester people do not want to see the trams disappear, but the opposition to the proposals is mainly in respect of the method of replacement.

An Important Load

The principal arguments are that considerable harm will be done to the Electricity Department unless trolley buses are substituted and that the motor bus depends upon imported fuel while the trolley bus uses electricity generated from the combustion of coal. The case put forward against the trolley bus by the Transport Committee is its inferior flexibility and higher capital and running costs.

The points which are advanced by the Transport Committee's critics are incontrovertible. If it loses the traction load the Electricity Department's annual sales will be decreased by over 42 million kWh and a considerable amount of plant will be rendered idle. This argument is countered by the contention that the loss would soon be made up by the normal development of the undertaking, which is rather cold comfort.

The doubtful wisdom of relying on imported fuel in these troublous times is a point cogently stressed by the Coal Utilisation Council which on this occasion has joined hands with the advocates of electric traction.

The figures of capital and running costs and revenue upon which the Committee based its decision are undoubtedly in favour of the motor bus. But these figures are attacked by the opposition, and, indeed, there seems to be no reliable "yardstick." For instance, while the Committee's estimate of costs for trolley bus operation is said to be 16.097d. per car-mile, the latest Ministry of Transport returns give an average figure of 12.45d (including interest and redemption) for undertakings outside the London area.

Why Are Costs So High?

Although both costs and revenue are governed by the circumstances of each individual case, the above estimate far exceeds the figures obtained elsewhere. Manchester, with its high traffic density—a factor that favours the trolley bus system in view of the fixed charges on overhead equipment—should surely aim at something better than ordinary provincial towns now achieve, even without the help of a price for electricity as low as 0.45d. per kWh, which is only some 60 per cent. of the average charge. Yet on the basis of this estimate it would apparently cost Manchester more to operate trolley buses than any undertaking in England! A comparison of the ratio of gross receipts to working expenses of the two systems is lacking; this is of even greater importance than cost of operation and has elsewhere proved the value of the trolley bus.

There are many more considerations to be taken into account. We have mentioned the principal ones to draw attention to the matter in the hope that the sections of the industry affected will make good use of the few months' delay to endeavour to secure a larger share of the Manchester transport service for electric traction. The London Passenger Transport Board has shown the way. Can we hope that, for once, what London thinks to-day Manchester will think to-morrow?

London J.E.A. Finance

FOR good or ill, strict financial rectitude has prevailed in the difference between the Electricity Commissioners and the London and Home Counties J.E.A. and the latter will endeavour to balance its budget by increasing its charges, extending its meter rentals and doubling its cooker hire charges (in the case of new transactions). The Authority's 125,000 consumers, backed by the sensational Press, will no doubt feel aggrieved for a time but, though some may fall away, we do not think that the ultimate effect will be serious. There is one point in the report submitted at last Monday's meeting which mystifies a little. The Commissioners insisted on the repayment of cooker loans in the usual seven years. The Finance Committee bases its revised estimates on a ten-year redemption period as, to quote the report, "we understand that this period is likely to be favourably considered by the Commissioners."

Public Lighting Outlook

ONE thing emerging from last week's Public Lighting Conference which is particularly encouraging is the readiness of mind in some important quarters to accept the view that present ideas as to light source, mounting height and spacing are likely to be subjected to revolutionary changes—probably in the near future. This tendency to change of outlook is all the more marked and promising because it follows soon after the introduction of the Ministry of Transport's Report and suggests, therefore, that effort will not be reduced as the result of standardisation recommendations. It is not really very wise to dismiss consideration of the sun as the best possible source of street lighting as folly—for after all daylight *is* the best light, and where normality exists there can be no bad results from investigating how far it is possible from the economical aspect to reconcile natural lighting facts with artificial lighting requirements and possibilities. New lighting sources of tremendous concentration are being evolved for other purposes and the engineer must find out how best to apply these to the public need. A special responsibility rests on the public lighting engineer at the moment in regard to road accidents, but the very gravity of this problem offers help to him in that "economy" must have a wider interpretation than in terms of £ s. d.

The E.I.B.A.

WHILE the calls upon funds of the Electrical Industries Benevolent Association during 1937 increased by 43 per cent., the net charitable income rose by only 28 per cent., a state of affairs which must not be allowed to continue. The contributions received by the Association bear no relation to the importance of the industry which it serves, amounting merely to 0.1d. per £100 of capital invested in the industry. Although, no doubt, the amount would be better expressed as a percentage of the industry's net profit and the salaries paid, it is clear that very little effort is required to make a tremendous difference to the state of the funds and enable the Association to render the greater assistance which it feels it ought to be able to give.

Eastbourne Contractors

THE proposal to terminate the arrangement between the Eastbourne Electricity Department and the local electrical contractors with regard to the sale of apparatus was deferred by the Council last week. The Electricity Committee has already seen a deputation from the contractors—which put forward a number of arguments in favour of continuing a policy of encouraging the contractors to run showrooms and even suggested that the Corporation should close its own showrooms except for demonstration purposes. The latter proposal was, we think, rather daring and hardly calculated to please the Electricity Department. The Electricity Committee has undertaken to see the deputation again on September 21st, by which time it is expected that the Eastbourne branch of the E.C.A. will have formulated a scheme for the Council's consideration.

The Human Element

IT is a pity the report got about that the interruption in the supply (generally for about 12 minutes) to the north-western and western districts of London at 4.30 p.m. last Friday was due to a "technical defect" at Willesden grid sub-station. No doubt, in spite of the sound design and workmanship put into the components supplied by British manufacturers for the grid, defects will be met with from time to time, but the public pays electrical engineers the high compliment of expecting their work to stand up to all conditions of practical usage. Errors of judgment, as in the case under mention, are far more readily understood and allowed for. The most experienced men have been known to fail at critical moments—locomotive drivers and signalmen, as well as those engaged in the installation or operation of electrical gear — for reasons that sometimes seem incomprehensible in the cold light of after-investigation. Unfortunately, the often far-reaching consequences of mistakes prevent their "getting away with it" as in other walks of life.

Forced Entry

WE were sorry to see a complaint last week in a daily paper from an unsuspecting householder who had answered a telephone call only to be pestered with a "sales talk" from an employé of what was described as a well-known electrical firm. This is a pernicious American idea which we never thought we should see introduced into this country. We can think of nothing better calculated to antagonise the victim and cause him to shun for ever the products of the firm concerned. No doubt in this case it was the misguided enthusiasm of the saleswoman (for it was a female voice) that prompted the false move; we cannot believe that any responsible electrical company would countenance a practice so likely to do it more harm than good.

What are Showrooms For?

WE paid a visit to the showrooms of a leading fire manufacturer the other day and were as much impressed by the method of displaying the various models as by the fires themselves. The arrangements were purely "functional" (to employ the modern *cliché*), that is, attention was not diverted from the fires by their setting. Too often architects and decorators are given their heads with the result that the trees cannot be seen for the wood (probably in the form of elaborate panelling). There is another aspect of this: Apart from the questionable selling value of overdone decoration, such grandiose establishments scare off the humbler customers who, after all, are the backbone of most electrical businesses, particularly that of electricity supply. We are not advocating the employment of the drab and commonplace but merely insisting that lavishness is often waste.

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Electricity in Shipbuilding

An extensive welding installation

BY the courtesy of Smith's Dock, Co., Ltd., we were recently able to learn something of the extensive applications of electricity to shipbuilding at their River Tees dockyard, South Bank, Middlesbrough, where there is a consumption of 4 million kWh a year. In sizes from one h.p. to 650 h.p. there are motors totalling about 8,000 h.p. By the judicious use of synchronous motors the power factor of the complete installation has been raised from about 50 per cent. to about 70 per cent.

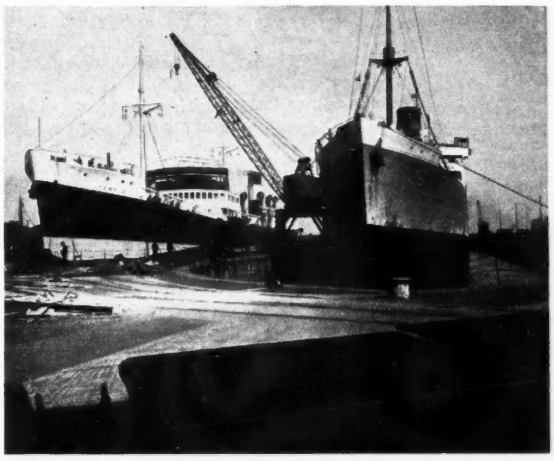
The dockyard covers an area of about 80 acres on a frontage on the River Tees of about 400 yd. As an industrial concern engaged in shipbuilding, ship repairing and docking, also marine engine building, the organisation may be regarded as in three main sections—the shipyard with its six building berths, capable of accommodating new ships up to, say, 500 ft. long, and such departments as the joiners' and blacksmiths' shops and the platers' shed and welders' shop; the docks at the east end of the river frontage; and the engine works with its fitting and boilersmith shops, and so on, at the end of the site farthest from the river.

The main uses of electricity throughout all these sections are welding and pumping, crane, capstan and winch driving, &c., the provision of compressed-air and hydraulic services, machine and machine-tool driving, and the provision of temporary d.c. bulk supplies to ships in dock.

It was pleasing to see the great extent to which electric welding has displaced and is displacing riveting in ship construction, for which purpose a special and extensive distribution system, to be referred to later, has been laid down. Most of the plate joining is effected in the modern way and practically all superstructure work is welded for the sake of lightness and strength. D.c. welding is carried out in all the berths by means of single-, double-, five-, and twelve-operator welding sets. All of these machines are portable and so are the resistance banks employed in the trailing-cable circuits serving the electrodes in the hands of the operators at any and all parts of the ships' structures. These portable welding plants are supplied by means of trailing cables from three kiosks in each berth. Each kiosk is built up on angle-bar verticals with wrought-iron plates and a canopy and a bulk-head division. At one side doors provide a closed chamber for the distribution equipment, while the other side which accommodates the switch-plugs for the trailing circuits is "open."

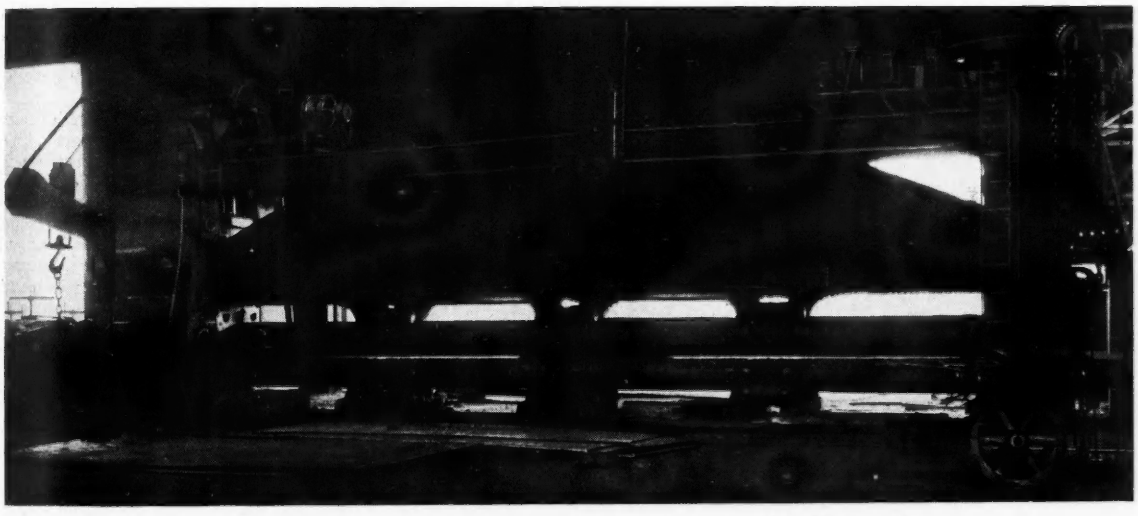
The l.c., p.i. and a service cable to each kiosk serves, *via* its trifurcating box, the central bus-bars from which the fuse boxes on the welding circuits are supplied. The switch-plugs on the "open" side each have three q.b. links leading to the three-way sockets and also an earth connection. The plug on the three-core and earth c.t.s. trailing cable, when inserted, is interlocked with the switch so that this can only be closed when the plug is in, and the plug cannot be withdrawn unless the switch is open. A screw cap seals the socket outlet to prevent the ingress of moisture.

An annexe to the platers' shed is the welder's shop where preconstructed sections of ship parts for later assembly on the berths are fabricated. Here we saw a.c. welding effected from a six-operator set fed from a 440-V three-phase transformer affording 80-V open-circuit supplies. Each operator has a 250-A load available at, say, 25 V. Construction of steel masts is another application of electric welding. The plates are first rolled as semi-cylinders and after assembly horizontally on the outdoor welding equipment the seams are welded in the normal way.



Nos. 11 and 12 docks showing the s.s. "Umtata" undocking and the s.s. "Tambua" in dock; also a 30-ton dock crane

Pumping plant, mainly for de-watering the docks, represents another important use of electricity. There are two pump houses on the decks, each serving two docks. Nos. 11 and 12 docks are, respectively, 575 ft. and 400 ft. long, 71 ft. and 55 ft. wide, and 28 ft. deep to the sill (actual high-water depth). The two pumps in the house serving these docks will empty the larger dock in about an hour. Each pump will deliver 90,200 gallons of water per minute and is driven by a 500-h.p., 2,750-V slip-ring motor with a liquid starter. The pumps are situated at about 20 ft. below water level and the pump house, which is entirely below ground level, measures 68 ft. by 20 ft. by about 40 ft. high.



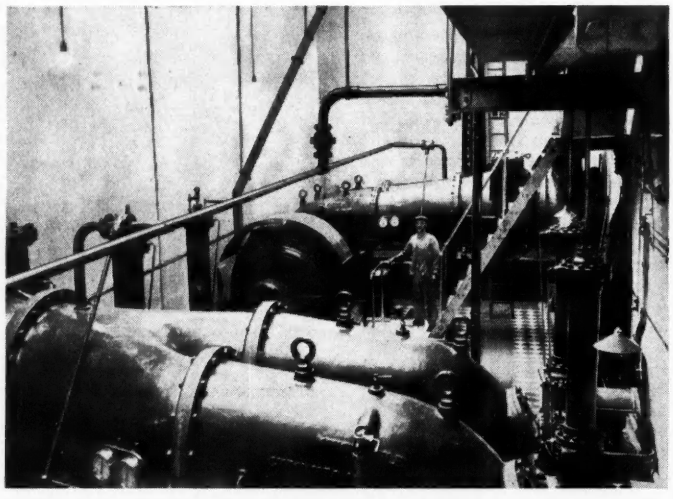
28-ft. plate rolls in platers' shed, with two 20-h.p. motors for raising the top roll

In the similar but older pump house for Nos. 14 and 15 docks, the two 400-h.p. motors driving pumps of about the capacity of those in the other pump house, are 440-V machines. In both pump houses there are 440-V equipments for such auxiliary services as secondary pumping of water below the level beyond which the large pumps are incapable of operating, tertiary pumps serving drainage sumps, and valve operation. In the Nos. 11 and 12 pump house there is also a 45-h.p. motor-driven pump for fire-fighting service, and this and the other auxiliaries in this house are fed from an eight-way distribution board with three step-back rows of fuses for the three phases. By a plug-in arrangement load readings for any of the circuits mentioned can be taken by a single ammeter.

On the jetty in the shipyard there is another pump house with a 40-h.p. set which, in addition to providing useful fire-

fighting equipment, also serves for filling the ballast tanks of cargo ships and the oil tanks of oil ships for testing purposes.

Electric crane service is deemed indispensable, not only in the shipyard and at the docks for outdoor derrick-type equipment, but also in the engine works and welding shop where there are some interesting span travelling equipments. For instance, in the fitting shops there are a 100-ton and a 50-ton cranes in the erecting department, and a 25-ton and a 10-ton cranes in the machinery department. All these equipments have four motors for hoisting, travelling, cross travelling and long travelling, respectively. The hoisting motors for the 50-ton and 100-ton cranes are 60-h.p., and for the two smaller sizes they are 25-h.p. equipments. For general purposes at the dock, lifting in and out ship plates and engines, for instance, there are a 30-ton and a 25-ton outdoor cranes, and at the shipyard jetty there is a 10-ton similar crane.



Pump house for Nos. 11 and 12 docks

Each outdoor crane is of the four-motor type and is supplied by a 3-core and earth trailing cable from a switch-plug in a pit. On the crane structure is a cable-receiving drum which automatically winds and unwinds as the crane is moved along the quay or dock side, and near the switch-plug pit is a lever arm through which the cable is threaded and by means of which a convenient "throw-over" of the cable from one side of the feeding point to the other is provided for as the crane moves to and fro, thus preserving the cable at this vulnerable point.

For moving ships along the river over the whole dockyard river frontage there are seven motor-driven capstans, while similar capstans around the docks are used for warping ships in and out of the docks. The dock capstans are also used for erecting ships' propellers which weigh from 5 tons to 25 tons each. Each capstan motor is a totally enclosed slip-ring 30-h.p. equipment at a one-hour rating. It is served by a tramway-type controller. Each motor with its control equipment and also the power transmission gear for the capstan proper is housed in a cast-iron box sunk into the ground with suitable inspection covers and mushroom ventilators. The box measures 7 ft. by 5 ft. by 2 ft. 6 in. deep.

Electric blower-fed forges and compressed-air hammer in blacksmiths' shop

For opening and closing the dock gates there are eight winches, each with a 17-h.p. motor drive, each motor being a totally enclosed slip-ring equipment with a tramway type controller. Each winch is protected by a wooden structure from which extends a wheel for the purpose of operating the controller.

There are about a dozen winches in the shipyard which are used largely for lifting weights in the building berths. These winches operate in conjunction with "Samson" posts so as to give a derricking effect. In each of these shipyard winches the motor is geared on to a sheath which serves the bollard with a right-angle drive. Some of the motors are 17 h.p. and others are 27 h.p. machines.

Riveting is still, in some cases, a specified method of construction for ship's hulls, and this work is effected by compressed-air riveting machines. There are in the blacksmiths' shop eight compressed-air operated hammers used for the production of heavy ship and engine forgings. For these and other compressed-air services there is a central compressor house situated near the engine works. There are four compressors in this house, all driven by self-synchronising motors. One machine of 205 h.p. has a driving unit of 190 kVA; a 160-h.p. machine has a 168-kVA drive; while two 560-h.p. compressors are each driven by a 570-kVA motor. The motors are all wound for 2,750-V and are served by liquid starters. At the time of our visit one of the largest machines, when loaded at 500 h.p., registered a power factor of 92 per cent.

All the compressors deliver air at about 100 lb. per sq. inch. For circulating cooling water around the jackets of the compressors there is also in this house a motor-driven circulating pump. There are also in the blacksmiths' shop 36 forges used for the production of light forgings such as ships' handrail stanchions and other fittings. These are supplied with air by two motor-driven fans (one a stand-by) and there is a similar forge blower scheme for the ground-level fires on which ships' plates are heated in the boiler smiths' shop.

A good deal of the framework of the ship is constructed on the furnace blocks where, for instance, frames are made to template by bending angle bars by means of hydraulic jacks which can be anchored to the blocks at any point to give the desired "leverage."

Hydraulic power is also used for making wood hatch covers in which the timbers are joined together by driving a bolt through holes slightly smaller than itself. For instance, a $\frac{7}{8}$-in. bolt is rammed into a $\frac{1}{2}$-in. hole. Further, in the platers' shed there are hydraulic flanging machines and presses in addition to hydraulic cranes which are used for lifting plates to punching and shearing machines. A central hydraulic plant near the compressor house meets the demands of all these services. There are two 100-h.p. slip-ring motor-driven sets of pumps serving *via* an accumulator on which trip switches provide for automatic operation of the motors according to the level of the accumulator.

Normal machine and machine-tool driving is, of course, responsible for a very large proportion of the electrical consumption and the following are a few of the machines which especially attracted our attention. In the platers' shed a planing machine used for trimming the edges of ships' plates is driven by a 30-h.p. motor; a machine for counter sinking holes in ships' plates has a 7½-h.p. drive; a scarfing machine which is used for bevelling down plates at the ends so as to reduce overlapping projections is served by a 20-h.p. motor; 28-ft. plate rolls have a 120-h.p. motor drive on to the bottom roll, while two 20-h.p. motors are used for raising the top roll for adjustment; three-member punching and shearing machines have up to 30-h.p. drives.

In the machine shop a Craven wall planer (27-ft. planer, 16-ft. slot) was engaged on machining an engine bed at the time of our visit. For affording speed variation from 410 r.p.m. to 950 r.p.m. it has a 35-h.p. d.c. motor drive with Ward Leonard control. Another d.c. drive in which fine speed control is accomplished by field regulation of the supply m.g. set is a Butler planer which is used for cutting out and slotting engine parts.

With a total h.p. of about 200 there are in the joiners' shop engaged on the production of berths and ships' furniture many fine examples of individual drives for all types of wood-working equipment, including some of the modern very-high-speed high-frequency machines.

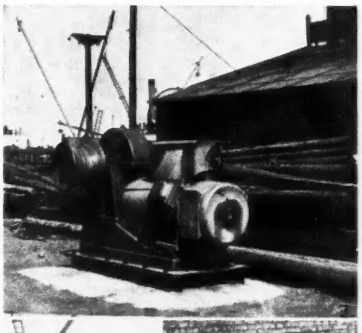
While ships are under repair in the docks or at the quays bulk supplies of electricity are often given from the dockyard's d.c. system at either 220 V or 110 V as required. Cables from the d.c. plant in the sub-stations terminate at plug boxes around the docks similar to the scheme for the crane supplies. In the power house near the engine works there are two 60-kW, 220-V m.g. sets. In No. 2 sub-station near the docks there are one 72-kW and one 15-kW, 110-V m.g. sets, and there is also another m.g. set in No. 5 sub-station at the West end of the berths.

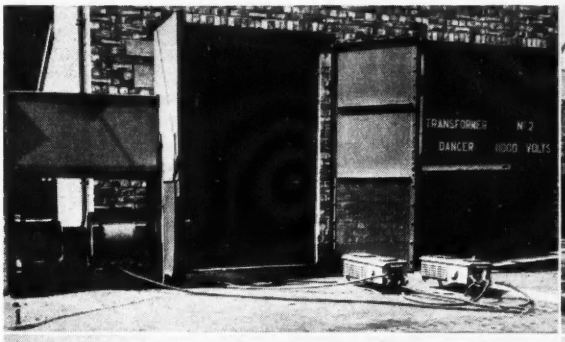
Electricity supply for the whole of the dockyard is received from three points on the N.E.S. network at 11 kV at the main sub-station at the S.E. corner of the dockyard. For one service only, welding, there is outward distribution at this incoming pressure. The 11-kV welder feeder supplies the shipyard welding sub-station between the berths and docks, and it is taken "solid" to two 900-kVA transformers which afford 440-V welding distribution. Through two 1,200-kVA transformers in the main sub-station 2,750-V distribution is provided to several points. There are three feeders at this pressure, for instance, to the compressor house near the engine works. Two feeders at the same high voltage serve the pump house for Nos. 11 and 12 docks, but one of these feeders is looped into No. 2 sub-station near the docks, and from No. 2 sub-station there is a supply at the same pressure to No. 3 sub-station near the engine works. Similar transformers at the main sub-station provide 440-V supplies to No. 3 sub-station and No. 4 sub-station at the far side of the dockyard, and an interconnector between these secondary sub-stations provides a useful low-voltage ring main.

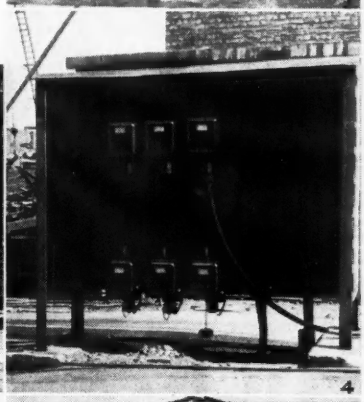
There are two low-voltage feeders to the power house in the engine works and from this house there is a low-voltage interconnector to No. 3 sub-station, while a further interconnector at the same voltage links Nos. 2 and 3 sub-stations. At the N.W. corner of the dockyard there is No. 5 sub-station, which is served by two feeders from No. 4 sub-station.

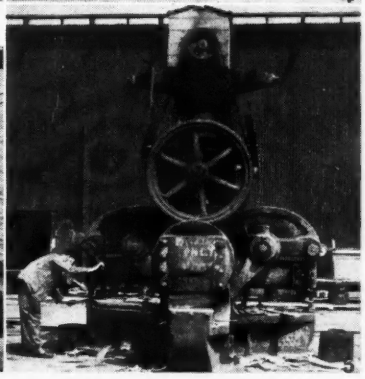
The pump house for Nos. 14 and 15 docks is supplied at 440 V direct from the main sub-station. Suitable transformation from 2,750 V to 440 V is provided for at Nos. 2 and 3 sub-stations. With the exception of some of the older equipment at the power house and the most recently installed open-type 440-V switchboard at the shipyard welding sub-station, practically all the switchgear throughout each sub-station is of the iron-clad horizontal isolation type.

From the 440-V distribution board in the welding sub-station six feeders serve the welding kiosks *via* a concrete tunnel which runs the whole length of the shipbuilding berths' site. This tunnel is 600 ft. long, 6 ft. deep and 4 ft. 6in. wide. Generally, each feeder is taken to one kiosk of the central line and from this the two corresponding kiosks of the outer lines are fed. All the cables from the main sub-station to the secondary sub-stations are housed in concrete troughs fitted with inspection covers. Other cables are laid in troughing and covered with bitumen.









1. Double-operator welding set and resistances in trailing circuit in front of shipyard sub-station. 2. Capstan on jetty showing drive in well; welding set at rear. 3. 20-h.p. winch for raising weights in the building berth. 4. Open side of one of the welding kiosks showing switch-plug outlets to portable equipments. 5. Electric punching and shearing machine for plate work in shipyard

The E.I.B.A. in 1937

WE have received the 1938 Year Book of the Electrical Industries Benevolent Association which says that during the past year more calls than ever have been made upon the Association's funds by deserving men and women in the industry and even greater calls are anticipated in future. Actually, the amount of financial help given to applicants rose by 43 per cent. in 1937, reaching a total of £5,336. The number of new applicants increased from 34 to 53, and in all help was given to 316 people. The annual amount has more than doubled since 1933.

Details are given of the many ways in which the E.I.B.A. has rendered valuable and timely assistance to the less fortunate members of the industry and typical cases are quoted.

The total charitable income for 1937 was £13,754, an increase of £3,768, and the amount reserved in respect of future payments on deeds of covenant was £5,024, an increase of £2,033, leaving a net amount retained as revenues of £8,730, an increase of £1,735 or 28 per cent. To this is added interest and recoverable income tax making a total of £11,338.

Particulars of outstanding donations during 1937 are given, and it is mentioned that the associate membership increased by 22 per cent. to 3,297, and full members of other grades by 56 per cent. to 2,080; the total, however, represents only 5 per cent. of the non-manual workers of the electrical industry. It is suggested that each member should set out to enrol three others during the current year. It is also considered that the help given by authorities, companies and firms, although considerable, is not commensurate with the size of the industry, representing less than 0.1d. per £100 of capital invested in the industry.

Reference is made to the penny collections, to the help offered by the E.A.W., the I.M.E.A. and E.D.A., and to the deed of covenant method of subscribing to the fund which enables income tax to be recovered. Another matter touched upon is Mr. Frank Parkinson's Committee on electrical benevolence and the report concludes with an appeal to the industry to come forward with that assistance which is so badly needed to enable the Association to expand its work.

Use of Electricity in Other Countries

Interesting comparisons contained in papers presented at the Vienna Sectional Meeting of the World Power Conference.

LAST week we gave an account of the Vienna Sectional Meeting of the World Power Conference with especial reference to papers presented by British delegates. Points from some of the others are set out below. Under the heading of "Supply of Energy for Household Purposes" it was shown that, in nearly all countries, the connection of large appliances is handicapped by the small sizes of rising mains and house wiring. Less progress is being made in space heating than in any other major application. The tendency is to use one meter for all purposes except hot-water storage by night.

The state of domestic electrification varies within wide limits in different countries. Thus in Latvia electricity supply, except in the largest towns, is in its early stages and wood is cheap; about 10 per cent. of the consumption in Riga is domestic and 68 per cent. of all households are connected; with an average consumption of 141 kWh. Argentina's total consumption is estimated at 1,800 million kWh. Some 3.5 million of the 12.3 million inhabitants live in Buenos Aires, where the consumption is 370 million kWh; the proportion used per household is not known, but is much below 100 kWh.

In Denmark 72 per cent. (96 per cent. in towns and 50 per cent. in rural areas) of all households are electrified to the extent of 100 kWh as an average. Some 415,000 households are supplied with d.c. mostly from municipal systems and 335,000 with a.c. mostly from privately owned stations. Low-voltage (13 V mostly) cooking plates are becoming popular.

About 70 per cent. of households in Rumanian towns are electrified (128 kWh each) and in 1936 took about 80 million kWh (20 per cent. of the total produced). Two-fifths of the country's output is used in Bucharest and the supply in rural areas, where wood is cheap, is negligible.

The domestic share of the 2,000 million kWh sold in the Netherlands in 1935 amounted to 40 per cent. or 73 kWh per inhabitant (Rotterdam 217) and 307 kWh per household. The number of electric kitchens supplied in 1937 exceeded 25,000 and is expected to reach 40,000 this year, and there are 64,000 hot-water storage tanks in use. Three-quarters of the latter are in Amsterdam, Rotterdam and the Hague.

Domestic Supplies in the U.S.A.

In the United States 80 per cent. of the population (100 in cities, 70 in rural areas) use electricity. Domestic supplies account for 18 per cent. if the total energy consumed (793 kWh per household) and 35½ per cent. of the revenue. Two-thirds of the increase during the last ten years is due to radio sets and refrigerators. The value of domestic appliances sold in 1937 reached $890 million. All but 5 per cent. of the undertakings are company owned.

Electrification in Hungary covers only 34 per cent. of the towns and villages with 70 per cent. of the population. In Budapest saturation is 79 per cent. In dwellings electricity is used almost exclusively for lighting, but local conditions for cooking are favourable. Electric cookers connected in Sweden approach 40,000 in number. High-efficiency hot plates are supplied with every cooker, and these as well as the ovens are equipped with automatic temperature control. A 250-W hay-box for warming and further cooking is popular. Refrigerators form part of the standard equipment of a modern kitchen, but hot-water storage tanks are little used.

More than 80 per cent. of all Austrian households use electricity, but the average consumption is only 95 kWh each owing to the low value in Vienna (74 kWh) outside of which it reaches 156 kWh. In Germany proper 13.7 million of the 18 million domestic premises are connected to the electric mains (about 9 million to gas). Of the 24,470 million kWh produced by public undertakings in 1936, 2,810 million went to small consumers in towns and 1,010 million kWh to a similar class in rural areas. In the same year there were 491,000 cookers and 124,000 hot-water storage tanks.

Of the 1,800 million kWh per annum generated by public undertakings in France, 12 per cent. is supplied for household purposes. Nine-tenths of the population use electricity and the consumption per dwelling amounts to 180 kWh or 45 kWh per inhabitant. Yearly requirements are 136 million kWh for cooking, 135 million for water heating, 24 million for refrigeration, 72 million for radio receiving sets and 1,400 million for lighting. The number of electric kitchens rose from 16,000 in 1931 to 195,000 in 1937 and of hot-water storage tanks from 19,000 to 67,000. The degree of saturation for kitchens is 2.5 per cent. of connected households and for water heaters 0.92 per cent. There are about 60,000 refrigerators in use.

The above particulars may be compared with those given in the paper by Mr. J. W. Beauchamp for Great Britain. In this he mentions that four million new houses have been built within the past twenty years. At least 64.5 per cent. of households are now served by the public mains and take 24 per cent. of the total kWh sold and provide 37 per cent. of the revenue with an annual consumption of 500 kWh.

In the section discussing "Small Scale Industries" it was stated that thanks to abundant water power, 3,200 kWh is consumed per head in Norway, although only three-quarters of the inhabitants are supplied with electricity. For extending the use of electricity in thinly populated areas the Government makes a contribution of about 40 per cent. of the capital expenditure, the municipalities being responsible for the rest and for management.

Dairy Supplies

A method of saving 20 kg. of coal per 100 litres of milk which requires only 5 kWh devised in Denmark is said to be leading to the conversion of dairies from coal to electric operation; this would save 80,000 tons of coal per annum for all the dairies in that country. Deacidification of milk in Germany in a dairy with a daily output of 1,500 kg. of butter requires 9,000 kWh during the summer months. In 58 per cent. of the small-scale industries in Hungary the owner works single-handed; only 6 per cent. use motors. Refrigeration is expected to bring a large increase in consumption.

Enterprises with 30 or fewer workers in Holland employ almost half the total number of workers; these had installed in 1930 only 0.93 h.p. per person against 4.2 h.p. in large industries. French employés in small industries form 21 per cent. of the working population. Enterprises employing no operatives have an average installed capacity of 5.7 kW, those with from 1 to 5 operatives 2.5 kW and those with from 6 to 20 operators 1.2 kW. In the knitted goods industry 0.5 to 3 per cent. of the goods' value is accounted for by cost of energy. Good results are reported from Poland in the electrifying of mills under a tariff based on weight of corn ground per month, which works out at 6 pf. per kWh.

Large electric kitchens in Switzerland number nearly 1,500 with an installed capacity of 53,000 kW; the consumption varies from 270 to 1,460 kWh per person per day at a price between 5 and 6 pf. per kWh and, for hot water storage, between 2.5 and 3 pf. per kWh. There has been a marked increase in the number of large electric kitchens in France during the last four years, especially in hospitals and hotels; figures for a school show 260 Wh per mid-day meal and tea and five hospitals show 340 to 830 Wh per patient per day.

Figures for the cost of arc welding are given in a Danish paper; they vary with the materials and between 0.36 and 3.14 Kr. per meter of welded seem for sheets of from 2 to 10 mm. thick.

Railway Electrification

There was a consensus of opinion in the Electric Railway Section that the various systems adopted for long-distance traffic had proved satisfactory and that there was generally no inducement to change from one system to another. For short distances the use of d.c. at from 750 to 1,200 V converted from three-phase systems is the usual practice. Rectifiers are replacing rotary convertors and remotely controlled sub-stations are increasing in number.

The country with the greatest proportion of its lines electrified is Switzerland, where 74 per cent. of the 2,865 km. of the Federal Railway lines is electrified; these handled 94 per cent. of the whole traffic in 1937, taking 618 million kWh at the power station and 541 million kWh at the sub-stations. Of the latter figure 7.3 per cent. was used for train heating. The consumption per gross ton km. (exclusive of locomotive weight) amounted to 47 Wh at the sub-station.

Electrification of all railways in France would cause a 75 per cent. reduction in the amount of coal consumed by them even if all the electricity was generated in steam stations. Expenditure on operation and maintenance is about half that with steam locomotives. Norwegian State Railways are 3,656 km. in length but only 334 km. is electrified; this, however, deals with a quarter of the entire traffic. Single-phase energy at 16⅔ cycles with a trolley wire voltage of 16 kV is supplied from water-power stations, some of which is purchased and converted from three-phase. The average price of energy is 3 ore supplied to the overhead equipment. Single-phase at 16 kV is also employed on the Swedish State Railways, at a frequency of 15 cycles for the 427 km. in the north and at 16⅔ for the 2,700 km. in the south, where it is converted from the existing 50-cycle three-phase system. The energy consumption per km. per annum is 190,000 kWh in the north and 130,000 in the south.

Impedance Bonds.

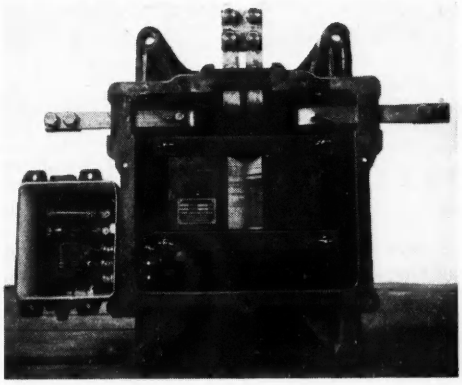
By H. C. Towers, A.M.I.E.E.

Their use for railway track circuits

RAILWAY track circuits for signalling may be classified as (a) d.c. circuits operated by primary or secondary batteries; (b) d.c. circuits fed from a d.c. main or through a metal rectifier; (c) a.c. circuits supplied from an a.c. signalling main. Where an alternating current supply is available a.c. track circuits have certain advantages over those worked by d.c. If used on an electric railway where no fourth rail is employed special problems arise. In this case the running rails are required for the return traction current, and they therefore cannot be isolated by double-rail track circuits without making some provision for the traction return.

Single-rail track circuits, one rail being electrically continuous for the traction current, can be operated with success for small tracks in station yards, such as those required for protecting points, &c., but they are not efficient on long sections due to voltage drop and a tendency for the traction current to saturate the track relay and the feed transformer.

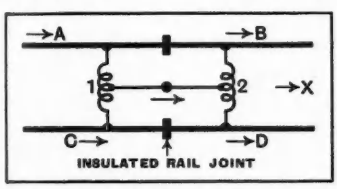
The double-rail track circuit can be utilised on electric railways with an earth return by employing impedance bonds. This type of track circuit has the running rails completely insulated from the block sections at each side and the traction current is passed around the insulated block joints by means of an impedance bond.



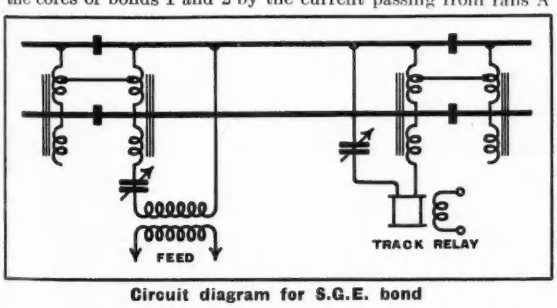
Westinghouse impedance bond shown with cover removed

Construction and Operation

The impedance bond consists of a large laminated core around which is wound several turns of heavy copper bar. The winding is tapped at the centre and, two of these bonds being placed at an insulated rail joint, the outside of the winding is connected to the running rails while the centre points are joined together. Assuming the return traction current to be flowing towards X in the first diagram, it does so along rail A, through one half of the winding of bond 1 to one half of the winding of bond 2, thence to rail B. Current flowing towards X in rail C passes through the other half of the winding of bond 1, to bond 2 and then to rail D. The windings are in opposition to each other so that the magnetic flux produced in the cores of bonds 1 and 2 by the current passing from rails A to B is neutralised by the current passing from rail C to rail D. The a.c. used for the signalling track circuits endeavours to pass from rail A to rail C and rail B to rail D, but as this has to traverse the whole of the bond winding, considerable impedance is induced. A very small a.c. magnetising current is necessary to produce the flux required to maintain a counter e.m.f. sufficient to prevent shorting.



Direction of flow of currents in double-rail track circuit



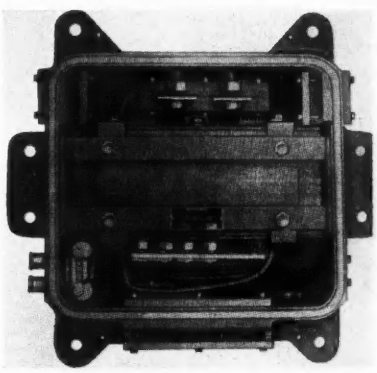
Circuit diagram for S.G.E. bond

The bond core is of high permeability, usually of shell construction, while the winding of copper is of sufficient cross section to pass the normal full-load traction current flowing in each rail. The bond is housed in a cast-iron box, filled with petrolatum or other suitable means to protect the winding, arranged to be placed in the four-foot way, between rails. Lugs are provided to permit the case being bolted to straps or direct to the sleepers. Cable connections between rails and bonds are usually bolted to connection straps which are taken from the internal windings through bushings in the case. In another type of construction the cable connections are taken through and terminated inside. The connections for the track-circuit relay or wires from the track feed transformer are terminated either on the bond connecting straps or on special terminals in the bond.

In some countries, where heavy rain is experienced at certain periods of the year, it is considered undesirable to remove the bond cover more than is absolutely necessary. In my experience, special terminals have been provided for the track circuit connections, housed in a small cast-iron box and fixed between the rails. These terminals are available for testing without the necessity of interfering with the bond.

Due to faulty bonding across rail joints, curves and exceptional wear on rails there is a tendency for the traction current return to become "unbalanced," in other words, more current flows through one rail than the other. This affects the impedance bond in that more current flows through one half than the other. The result of this inequality is saturation of the iron core of the bond with a corresponding loss of impedance.

It is found possible to overcome this particular trouble by providing an adjustable air gap in the core, which increases the reluctance. It is necessary, however, to adjust the track feed voltage also because of the increased magnetising a.c. required by the bond.



Internal view of the auto-bond

The efficient length of track circuits employing impedance bonds is limited, due to the shunting effect of the bonds across the track relays and feed transformers. The track feed transformer also has to be of larger capacity than those required for feeding track circuits without impedance bonds.

Resonated and Auto Bonds

A resonated bond, introduced by the Westinghouse Brake & Signal Co., contains a capacity circuit incorporated in the bonds. The magnetising current required is supplied by the resonant current from the condenser and the amount of current required to be supplied to the track on account of losses is correspondingly reduced.

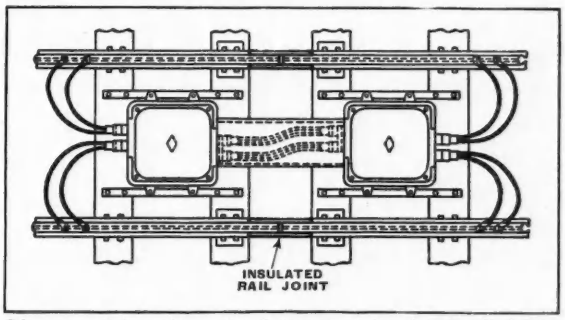


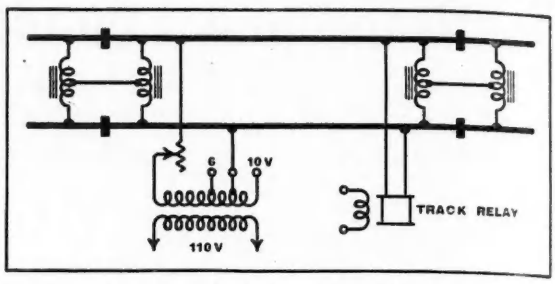
Diagram of impedance bond layout at insulated rail joints between two track circuits

Another attempt to operate impedance bond track circuits over greater lengths has been made with the S.G.E. auto

bond. Track circuits so equipped are operating over 15,000 ft. with good train shunts and very small power consumption. A diagram of the track circuit and an illustration of the bond appear on the preceding page.

In general appearance and construction this bond is similar to the ordinary impedance bond but, in addition to the winding through which the traction current flows, it has an auxiliary winding one end of which is connected to one end of the traction winding. In this way, the auto bond functions as an impedance bond and also as a step-down auto-transformer for feeding the track circuit, or as a step-up auto-transformer for operating the track relay.

Impedance bonds are usually designed for two standard capacities, 500 and 1,000 A per rail. The resistance to d.c. of all the trains in series is about 0.0008 ohm in the case of 500 A per rail and 0.0004 ohm for 1,000 A per rail.

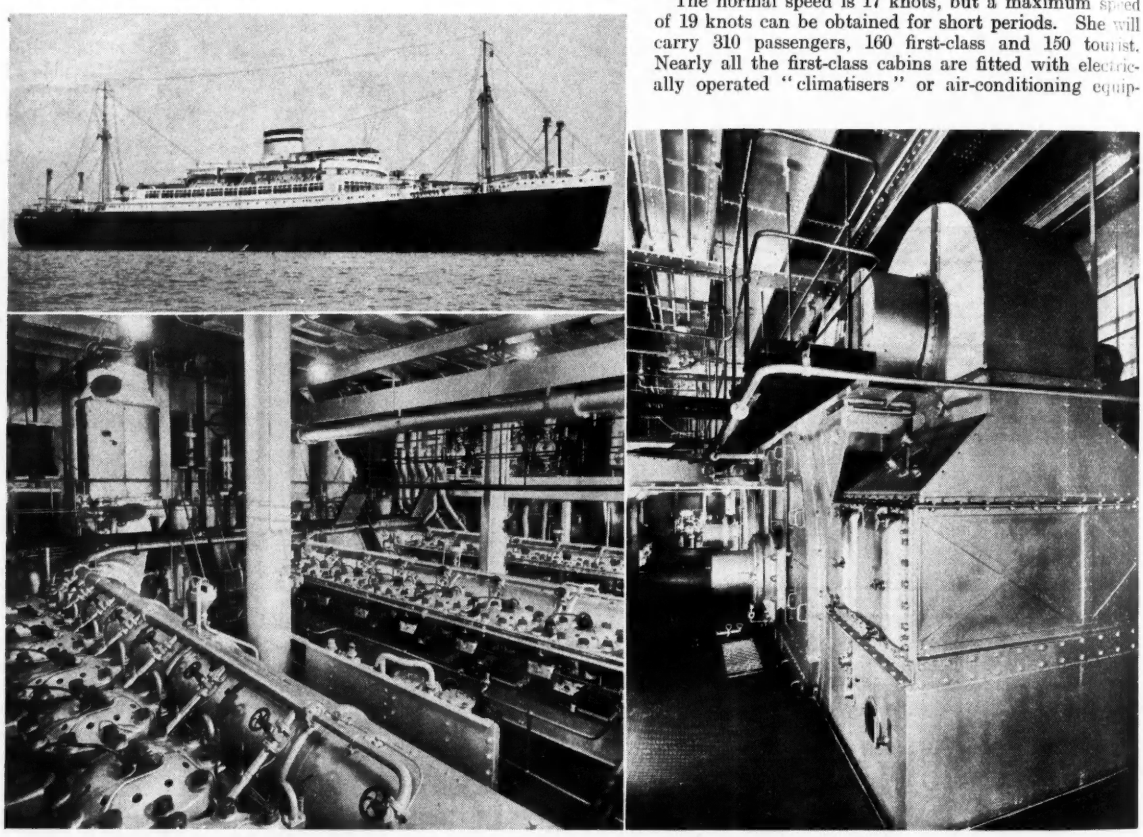


The double-rail track circuit diagram for impedance bond

New German All-electric Ship

Besides the Diesel-electric propulsion plant all the auxiliary machinery is electrically operated and the kitchen equipment is completely electric.

THE owners of the *Patria*, the new 16,600-ton passenger and freight ship of the Hamburg Amerika Line which started regular service recently between German ports, Southampton, the West Indies and the West Coast of South America, claim that the vessel is the largest Diesel-electric ship in the world and that no other vessel of its size is so completely equipped electrically.



The electric ship "Patria" with views of the propulsion machinery

Built by the Deutsche Werft at Hamburg, the *Patria* has an overall length of 597 ft. 6 in., a breadth of 73 ft. 10 in., and a depth of 32 ft. 4 in. to the bulkhead deck, the deadweight carrying capacity being 8,500 tons.

Power for propulsion purposes is supplied by six 3,000-h.p. non-reversible Diesel engines of the single-acting two-stroke cycle M.A.N. type, each being directly coupled to a 2,140-kVA, 3.3-kV, three-phase alternator. The vessel is propelled by twin screws, there being two propulsion motors arranged in a space right aft.

In the *Patria* the usual shaft tunnels are eliminated and their place is taken by two cable ducts, thereby increasing the cargo-carrying capacity of the after holds. The propulsion motors are of the three-phase synchronous type, each having a continuous rating of 7,500 h.p. Under normal circumstances of running the energy from three of the Diesel-driven generators is supplied to each of the propulsion motors, but provision is made for the interconnection of the two sets of three generators as required, while at cruising speeds two or even one generator of each set can be employed, which adds considerably to the efficiency of operation.

The normal speed is 17 knots, but a maximum speed of 19 knots can be obtained for short periods. She will carry 310 passengers, 160 first-class and 150 tourist. Nearly all the first-class cabins are fitted with electrically operated "climatisers" or air-conditioning equipments which keep the temperature and moisture of the air at the optimum value. This is important as the ship is intended for service to the West Coast of South America.

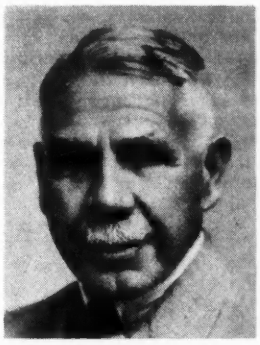
All the auxiliary machinery in the engine room as well as the cargo handling equipment on deck is driven by electricity, the latter including four electric cranes capable of handling lifts up to 30 tons and fourteen electric winches. The cooking is carried out entirely by electricity and the equipment in the kitchen is all electrically driven, even including an electric saw for cutting bones. The steering-gear, the compass, the alarm system and the clocks are electrical, right down to the morse light and to the echo-sounding equipment.

The accommodation for officers and crew totalling 230 men is of high standard.

Dam Construction in China

The adoption of modern methods

By Prof. C. A. Middleton Smith, M.Sc., M.I.Mech.E.



The author, who is Taikoo Professor of Engineering at Hong Kong University

WHATEVER may be the result of the present conflict in China, there will be plenty of work for engineers there when peace returns. The war has stimulated the extension of communications. It has created a demand for mechanism, not all of which is directly concerned with slaughter. A few days ago a Chinese engineer, who graduated in Hong Kong, called upon me, seeking advice. He had been commissioned by the Chinese Government to purchase, immediately, a number of small self-contained electric lighting sets for use in dug-outs at the front. It must be confessed that the statement that electric light was in demand for Chinese dug-outs created astonishment, for the vast majority of the Chinese people still use candles or oil lamps in their homes.

Soon after my old student left me the ELECTRICAL REVIEW of May 1st arrived from "home"; that issue contained an interesting account of the use of electric power in dam construction for the Ladybower reservoir in Britain. It reminded me that, on similar work in China, it had been demonstrated that in spite of cheap labour (the cost averaging, for skilled workmen 2s., and unskilled workmen 7d. a day) it was proved, beyond cavil, that it paid to use mechanism, wherever feasible, in place of man-power. It was stated that at Ladybower about 1,000 h.p. of electric motors was engaged in driving aerial ropeways, cranes, pumps, concrete mixers, compressors and crushing plant. In building a dam in Hong Kong some 1,600 e.h.p. of electric motors was used for similar work.

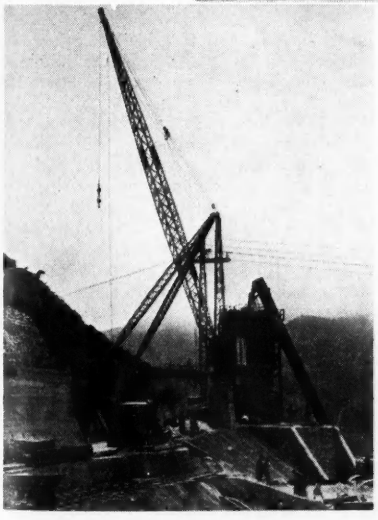
The Shing Mun dam, completed rather more than a year ago in the Crown Colony of Hong Kong, is the biggest dam in Asia or in the British Empire. Binnie, Deacon and Gourley, of London, were the consulting engineers, and Mr. G. B. Gifford Hull, the resident engineer. Its height above the bed of the stream through the gorge, which it blocks, is 285 ft., and its width at the base about 600 ft., to which must be added the considerable depth of foundations. While a considerable portion of the structure consists of concrete—the water face being reinforced—the major portion of the total amount of rock was employed for hand-packed filling behind the two separated concrete sections of the dam. A total of nearly 2,000,000 tons of rock, sand and cement is incorporated in this dam.

Shing Mun is on the mainland in territory leased from China until 1996. A few years ago the China Light and Power Co. erected a high-voltage transmission line, which passes near the site of the dam, through the leased territory.

Some thirty electric motors, varying from 6 to 150 h.p., were installed at Shing Mun. Energy was supplied at about 0.7d. per kWh on site. This is more than the price of power in Shanghai, where the Shanghai Power Co. has offered textile mills a rate of about 0.3d. per kWh. Costs of production of electricity in Hong Kong are, however, greater than in Shanghai; the load is very much smaller and, in this particular case, there was the cost of a fairly long transmission line.

The total cost of the dam in Hong Kong was, at the then rate of exchange, about £500,000. Competent engineers have estimated that the cost in Britain would probably have been at least three times that amount. The cost of the Shing Mun reservoir, 3,000 million gallons in capacity, worked out at about 7½d. per cu. yd. of water storage or £1 per 6,000 gal. of water storage. There was an unlimited supply of granite rock near the site. In spite of mechanisation, a labour force of 2,500 men was employed for five years. In order to maintain healthy conditions considerable expense was involved in anti-malaria work and medical supervision.

At Ladybower 600 tons of sand and concrete were obtained per day from a quarry nearby. At Shing Mun about 1,000 tons of granite, each day, for nearly three years, was obtained from quarries below the dam. A total of about 1½ million tons of rock was quarried and transported by mechanism to the dam site.

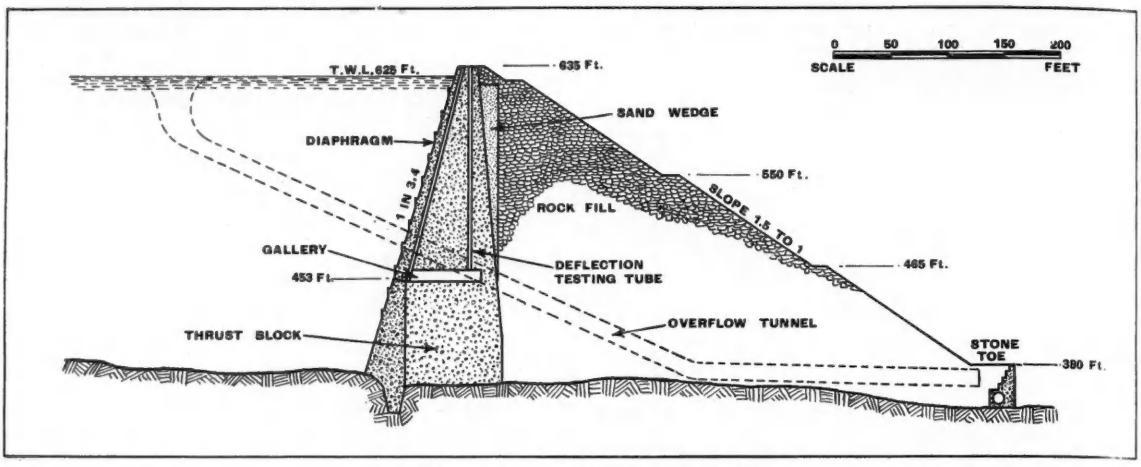


Above: Shing Mun Valley water scheme, showing the main dam during a flood. Left: A cement handling derrick. Cement was brought up in steel containers holding four tons and dumped into a silo above the mixers. Right: Electrically operated elevator supplying mixer bins with screened aggregate from the crushers

In striking contrast with the mechanisation employed at Shing Mun were the primitive methods used in the construction of the Tytam Tuk dam, completed in Hong Kong in 1917. This is a solid concrete structure containing a total of about one-seventh of the volume of material incorporated in the Shing Mun dam. Practically no machinery was used, not even a concrete mixer. If cement had been available the dam might have been built before the power era was ushered in by James Watt and Faraday. The height of the Tytam Tuk dam is 170 ft. from the deepest part of the foundations to the roadway over it. The maximum thickness of the base is 115 ft. It took seven years to build, while the Shing Mun dam was completed in five years. The reduction of overhead expenses due to the rapidity of construction through

mechanisation at Shing Mun saved a great deal of money including interest on capital expended.

The first reservoir built in Hong Kong (1866-71), impounding 66 million gall. of water, cost about £1 per 2,000 gall. storage as against £1 per 6,000 gall. storage at Shing Mun although local labour was very much cheaper seventy years ago. These figures are only approximate and do not include the cost of catchwaters, &c.; they are mainly the cost of dam construction. They are mentioned in support of the contention that on large civil engineering works in China mechanisation pays. This is the more remarkable because there are no workmen in the world more industrious, or more efficient, than the Chinese when they are supervised by competent engineers who have some knowledge of their psychology which contrasts with Western ideas.



Cross-section of dam at Shing Mun, Hong Kong

Changing Asia

In this changing world it is dangerous to attempt any forecast about the future. My own experience, during the past twenty-six years, has been mostly in the Far East, including several visits to Japan and travel of thousands of miles in China. Rather superficial glimpses of Malaya and India have been supplemented by many conversations with engineers who have carried out important works of construction and power development in those countries, and interviews with other engineers from the Dutch East Indies and the Philippines.

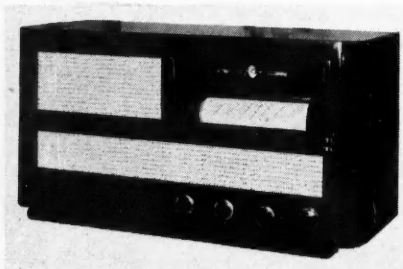
Everywhere there is evidence of the spread of mechanisation. Even a casual visitor to this part of the world must be impressed by the results of the works created by engineers. Almost suddenly aviation has come to China, and every week twenty-two commercial planes discharge their cargoes at Hong Kong. Air conditioning is now a frequent topic of conversation; in a few years any house built for well-to-do residents will contain equipment of this kind. The maximum power load, mainly used for air conditioning, recorded for the Hong Kong and Shanghai Bank Building in Hong Kong exceeded 600 kVA in the most humid weather.

Perhaps the most remarkable development in the Far East during recent years has been the proved ability of the Chinese professional engineer who has been able to supplement his academic training with the necessary practical experience. A tribute must be paid to the many British engineers who have provided facilities for, and taken a personal interest in, those Chinese who have been fortunate enough to serve under their supervision.

The Paris Radio Show

Automatic tuning prominent

As at "Radiolympia," particular interest at the Paris Radio Show last week centred around automatic tuning, examples of which appeared on the stands of the majority of manufacturers. The "Teleco" seven-valve superheterodyne set exhibited, for example, has an arrangement similar to an automatic telephone dial. By inserting the finger in one of the holes and pressing the button underneath, corresponding to the station desired, and then turning the dial, tuning is effected. All the sets in which automatic tuning has been incorporated are also provided with an ordinary tuning knob.



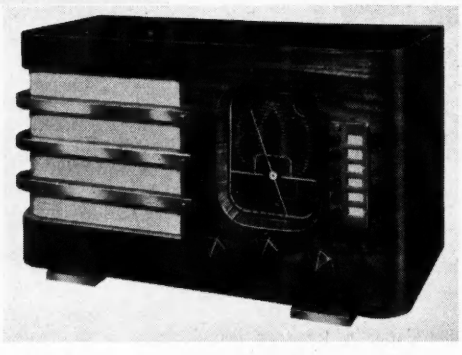
Ducrelet's new superheterodyne receiver shown at the Paris Radio Show. The dial bearing the station names is on a revolving cylinder

A continued effort on the part of manufacturers to produce sets with simple lines and of modern decorative effect was noticeable. Thus in a number of sets some or all of the control knobs are at the side of the set. This is the case, notably, with the "Sierra" sets, most of which have large, flat knobs at the side instead of on the front, giving them quite a distinctive appearance. The problem of having the controls always at hand has been solved by the firm of "Tentation," which has put the tuning knobs and the radio-frequency amplifier in a small case, about 5 in. square, which is connected to the set by a 15 ft. cable.

Another feature of the show this year was the attention devoted to the technical side. All the large manufacturers exhibited testing equipment, and the "Radiophon" firm even equipped a special stand with laboratory apparatus showing how the manufacturer studies the characteristics of various parts of the set with the aim of effecting improvements.

The Postal Administration had on view a complete radio-broadcasting van and a small broadcasting car, as well as a laboratory car for tracing causes of interference.

One surprise was that television was rather neglected. Half-a-dozen large international manufacturers showed television receivers, but little effort was made to draw special attention to them, perhaps on account of the restricted nature of television broadcasts in France.



The "Synchromatic 39" five-valve superheterodyne set with automatic tuning

Public Lighting Considerations

Discussions at the A.P.L.E. conference

Last week the Association of Public Lighting Engineers held its annual conference at Bournemouth, more than 600 delegates attending. A report of earlier proceedings was published in the ELECTRICAL REVIEW of September 9th, including abstracts of four interesting papers, the discussions on which are now given.

IN calling on Mr. J. F. Colquhoun to present his paper, "Ministry of Transport Departmental Committee on Street Lighting—Final Report," the president pointed out that the author was a member of the M.O.T. Committee. The discussion on this paper showed that many are not satisfied with the administration of public lighting affairs. Mr. Lennox suggested that roadway lighting should be dealt with in the same way as roadway construction and not left to utility authorities. He thought that the conditions set out would never be attained under the present scheme of sanctioning loans by the Ministry of Health. He said that whereas for large cities the institution of a really modern public lighting scheme meant a cost to the rates of only from 0.3d. to 3d. per £, to many of the smaller towns and villages the cost of such a scheme would be from 1s. to 2s. 6d. per £, and such a high cost rendered it quite impossible to aim at conditions anything like those set out in the Report.

Mr. Hoadley said that if it could be shown to those responsible for siting that the B.S. Specification, which would follow the M.O.T. Report would have to be adhered to before loans could be sanctioned, a great improvement in things would be brought about. In Maidstone, he said, lamps were still being erected which did not comply with the M.O.T. recommendations.

Councillor Benwell gave some interesting cost figures relating to the Bournemouth lighting. Whereas the cost of maintenance for Class A roads was £1,042, the lighting costs were £377, or 36 per cent., and while there was a grant towards the roads there was no contribution towards the lighting. He thought that too much attention was given to the main roads at the expense of the side roads where the vast majority of the inhabitants lived. Evidently, the possibility of using very much higher-powered sources, together with higher mountings and greater spacings is engaging the attention of many engineers. Mr. Gregory cited daylight, with its infinity spacing and single source, as the finest public lighting.

With the object of creating a broader outlook in defining spacing with regard to the possible higher sources of the future he visualised spacings of the order of 350 ft., and he declared that there was already a definite tendency to break away from set spacings. Future progress would depend on the cost per mile and that alone dictated greater spacings. On this point, however, Mr. Colquhoun answered him with a reminder that the idea of lower costs for greater distances was only true in a limited sense for the distance (spacing) was covered both by mains distribution and travel in maintenance. Mr. Gregory could not see a really serious problem in the possible necessity for water cooling much higher powered light sources.

Mr. Prowse declared that as we should inevitably build larger roads so we should have to increase outputs, mounting heights and spacings, and Mr. Lennox, in agreeing that there was no need to light dual carriageways as two separate roads, said he was all for longer spacings, making use of a single line of poles in the centre. Safety and visibility could, of course, no more be omitted from such a discussion than they could be separated one from the other. Mr. Waldram thought that if the recommendations were obeyed in the spirit visibility would be attained. If the siting were poor, he said, no amount of attention to visibility alone could right matters.

Mr. Greenhalgh considered that manufacturers had the one aim of producing "searchlights" which resulted in alternate

Four of the stands at the exhibition of lighting equipment held in conjunction with the A.P.L.E. conference

bright and dark patches on the roads. Under such conditions accidents would never be reduced. He called for a diversity factor to get an even spread of good light and declared that with accurate measurements of both light and dark parts they could say to the manufacturers: "Your lighting scheme is poor in spite of your thousands of candle power."

Mr. Lennox thought that 3,000 lumens could not be considered good from the point of view of safety factor when driving at 40 m.p.h. Economy could be measured, he implied, in terms of a reduction of accidents.

In referring to the "dusk to dawn" recommendation, Mr. Dobell said that in most towns there were dark and narrow streets running into broad streets, and it was not fair that the narrow streets should have to wait for the lighting of the broad streets. The only solution was the light-actuated switch. The author, however, thought that Mr. Dobell had over-emphasised the importance of the "dusk to dawn" clause.

The problem of lighting street bends is obviously a ticklish one, and Mr. Burman pointed particularly to the "S" bend where, he said, it was necessary to overlap to avoid black spots. It was not obvious in the Report that both sides of such a bend might have to be equipped, and difficulties in this connection could be overcome by some sort of grading. Mr. Hoadley agreed that at bends sharp irregular spacings were necessary to produce good results. Mr. Gregory agreed also on this point, and said that an overhang by suspension across the arc of the curve would reduce capital cost.

A.R.P. and Lighting

In presenting his paper "Air Raid Precautions and Lighting" on Tuesday afternoon, Mr. Wilkie stressed that he had no intention of comparing one system of control with another, nor of belittling in any way the Leicester experiment. His point was that while lighting had received the least attention it had, in fact, the greatest bearing on A.R.P.

There was not the usual free and easy expounding of views in the discussion on this paper. Indeed, Mr. Colquhoun asked if it were fair to the A.R.P. department of the Home Office to bring the matter at such a time into open discussion. For one thing, he said, if in advocating centralised control, Mr. Wilkie ruled out any other service but electricity, was it not too much to ask the Home Office to become a partisan?

Mr. F. C. Smith thought the author had introduced a highly controversial subject which it was impossible to discuss adequately without the undesirability of revealing all the factors. He suggested that the Home Office was familiar with the Air Ministry view that the objective of an aeroplane was more attainable with light. War, he said, could not be faced with equanimity and he was doubtful as to whether intermittent light was sound defensive tactics.

Mr. Crook felt that if the Home Office could be convinced that an entirely satisfactory system of control could be devised the total darkness regulations might be modified. On the question of public morale under raid conditions opinions became more definite and Councillor Benwell said that panic was the biggest thing that would have to be contended with, and manufacturers should produce a system to avoid it.

Mr. Crook contended that total darkness would produce more panic than bombs, while Mr. Colquhoun felt that the problem of morale preservation was one of mass psychology about which he, for one public lighting engineer, knew little or nothing. Mr. Smith contended that any accident risk associated with total darkness must be properly related to the greater risks that A.R.P. were designed to minimise.

One might sub-divide the advocates of light, as against total darkness, into full light and restricted light. Evidently, Councillor Benwell would go all the way for he wanted to know, as chairman of the Fire Brigade and Lighting Committees, how he was going to take fire engines through the roads in total darkness, and he called for a Government grant towards lighting control.

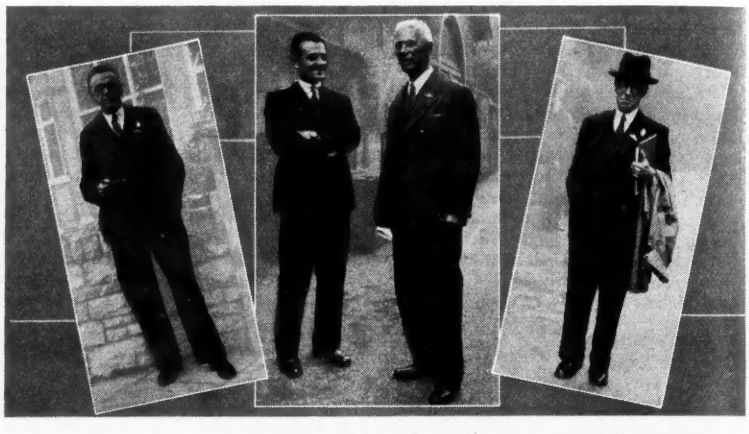
Mr. Crook thought that perhaps the security suggested by the air barrage was a reason to permit at least restricted light, and he felt that there should be no difficulty in devising a fitting which could be adjusted to give a 95 deg. cut-off when required. He thought it was too much that the regulation of 1938 should be more severe than that during the Great War, when a 95 deg. cut-off was permitted.

Mr. Smith said that under certain conditions a candle flame could be seen at a distance of a mile, and he felt that as recent experience had shown that relay raids constituted the greatest danger of all, on and off control was not a sound idea. Mr. Colquhoun criticised the author's peace-time ideas for central control, and asserted that the rigidity of such control was its disadvantage. This was emphasised during conditions with which he was familiar in the Sheffield district—of fog in the valleys and "clear" on the hills. But Mr. Wilkie said that by central control he had in mind something opposed to individual time switches rather than a too-rigid system.

In response to Mr. Colquhoun's "chipping" on his efforts to ensure that the next war would be as comfortable as possible, the author said that he suggested the more or less normal use of the motor car and cinema in no spirit of levity for war or no war they were things of human interest.

Lighting in a County Borough

In spite of criticisms we heard about the amateur photography of the illustrations used in the paper "The Development of Street Lighting in a County Borough," by Messrs. J. K. Brydges, M.I.E.E., and N. Boydell, A.M.I.E.E., we were impressed by the marked way in which road surfacing and building reflecting values were indicated by the slides. Visibility and glare came in for a good deal of treatment during the discussion, largely around the controversy of sodium *versus* mercury.



[*Elec. Rev. photos.*

Left to right: Messrs. Thos. Wilkie, J. K. Brydges and N. Boydell, and J. F. Colquhoun

Mr. Maxted voiced some criticism of the opinions summarised in the paper, but Mr. Boydell said they were quite honest opinions from representative members of the public, and that from the enclosed mercury fitting referred to there was much less glare than from any other type of lantern, vertical or horizontal. Mr. Maxted said further that in candle power and visibility, rather than the source of brightness, rested the factor of glare. Lantern distribution was far more important than colour.

Mr. Phillips stressed that glare was related to intensity as much as to source, and Councillor Benwell emphatically declared that one would have a job to find better light than sodium for visibility.

On the question of spacing, Mr. Phillips urged that light distribution must necessarily be related to this problem, and that as spacing was a matter of economics it was necessary first to settle the spacing, then to provide correct distribution, and, finally, to tackle glare.

The subject of grading came in for a few hard knocks, and Mr. Horsfall said that the paper had given him the impression that the M.O.T. favoured the gradation of light. That was not so, except in a case of shopping centres which were brilliantly lighted. But Mr. Boydell insisted that as traffic increased it was logical that group B lighting should be graded from group A lighting. On the score of planning the authors received a good deal of congratulation, and Mr. Horsfall said that after all the economy talk it was pleasing to see that one town, at any rate, could design a really good lighting scheme.

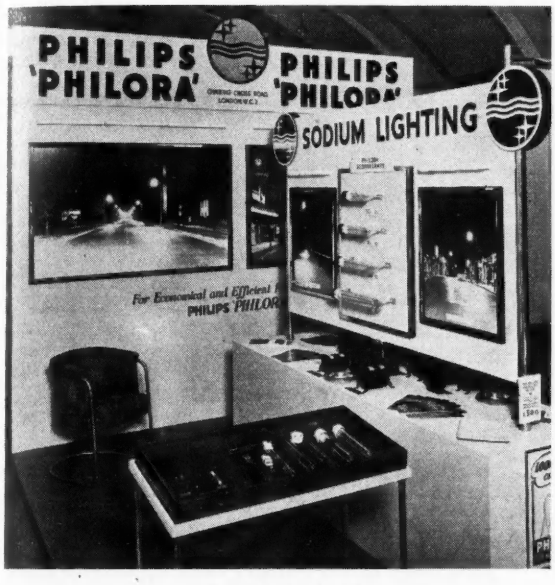
Mr. Parker also spoke highly of the idea of working to a fixed policy which was lacking in so many towns, and said that enthusiasts were too prone to ignore the feelings of the public. Mr. Overfield urged that more care should be given to the design of public lighting from the point of view of its bearing on the appearance of the town, and suggested some sort of a competition among artists for the production of suitable designs of lighting equipment.

On the question of siting at bends there was a good deal of overlapping with the discussion on the previous paper, and

Mr. Horsfall referred to the great difficulty in attaining angles of separation strictly to the M.O.T. regulations. When good angles had been obtained in one direction they were found too poor for the other direction and so a compromise was necessary. Further, the existence in the roads of distribution cables and pipes influenced the siting.

On the question of light-actuated control, Mr. Parker said that he had had difficulty in obtaining synchronism and he was sure that on the "dusk to dawn" clause the Minister of Transport had never intended to dictate the use of light-sensitive control. But Mr. Dobell reiterated that the M.O.T. Report almost insisted on light actuation. Mr. Boydell had found, however, that side streets under centralised control were switched on when the illumination was 2 ft. candles, and he suggested that such a lighting degree was not too low for the moment of switching on.

In response to Mr. Horsfall's query about the possibility of wireless interference from centralised control, Mr. Boydell said that the switching "signals" could certainly be heard, but they were not serious and no complaints had been made. Mr. Palmer raised an interesting issue about power factor correction, and said that having been faced with the difficulty of finding that the condensers supplied were not large enough, he had solved the problem by installing a 2-kVA condenser to



The Philips stand

each five units. Mr. Boydell said that they had never had cause to investigate the power factor question, but perhaps that was because of the lack of industrial load in Eastbourne.

Light Sources

We could hardly allow any reference to Mr. Aldington's paper "The Radiation from Artificial Illuminants," which was presented in Thursday morning, to pass without associating ourselves with the congratulations from all speakers on the author's remarkably convincing experiments, demonstration screens and slides, and on his great ability as a lecturer.

A point of contrast which struck us was that whereas at the exhibition there was an indication of the growing importance of sodium, Mr. Aldington's paper rather suggested that the future rested with developments in mercury. The suggestion that light energy might possibly be obtained from those regions of waste outside the visible spectrum, made a particular appeal in some instances, and Mr. Stewart said that the author had shown how the work going on was biting into that great area of waste. He hoped that it would lead to papers dealing particularly with the infra-red and ultra-violet regions. Mr. Jones said that in the mercury lantern of 400 W we had 15 per cent. energy in the blue and green, and 15 per cent. in the ultra violet, so that by making use of the invisible energy it would be possible both to improve the efficiency of the light source and to modulate its colour. Mr. Jones was proud of the fact that this country had been a pioneer in exploiting the discharge lamp for street lighting. He also asserted that the lamps of great concentration would certainly play their part eventually in street lighting.

The president said he felt he could not agree with the author that the powerful lamps were not in the province of the public lighting engineer. But he jokingly remarked that perhaps Mr. Aldington did not know that a mounting height of infinity had already been considered. In his reply, however, Mr. Aldington said he merely wished to stress that the special lamps had been designed for entirely different purposes from public lighting. As to the use to which they could be put in the public-lighting field, he said that when the public lighting engineer had achieved the necessary mounting height there would be no doubt about the manufacturer being able to supply the necessary light source.

Mr. Lennox believed that the time was not far off when we should have very much higher mountings and we should think of street lighting as the floodlighting of large areas. Mr. C. R. Smith said that they had had an indication that floodlighting was the proper source, but he asked if they were not approaching realms of absurdity in talking of mounting heights of half a mile. Mr. Lennox said he had noticed of late that there were fewer objections to the colour of discharge lighting, and this was due to the fact that time had shown that it was visibility which counted rather than colour. Mr. Aldington agreed that colour modulation should be settled by local conditions, but he warned his audience that they could not have their cake twice, in the form of both high efficiency at the middle of the spectrum and high visibility. It required much more energy to get the same output from red.

Mr. F. S. Smith felt that there were opportunities for increased output from temperature-radiation sources.

The Banquet

We congratulate the Association on the relief this year from the strictly business side of the conference in the speeches at the annual banquet at the Pavilion after Wednesday's sessions. They were few and, as Mr. W. L. Clowes, borough surveyor and engineer, Bournemouth, termed it, not "gas-filled." He assumed that public lighting engineers were responsible for illuminated addresses, and said he had found the technique of Mr. Woodward most valuable in connection with the town's floodlighting schemes. The Mayor of Bournemouth also paid a tribute to Mr. Woodward for his work in Bournemouth, and said that the public owed much to the two great industries represented by the Association. The A.P.L.E., said the president, had one object only—public lighting service. The idea behind the new educational scheme was public service, in the long run, and so were the many new ideas which were being exhibited at the conference. Among the distinguished persons mentioned by Mr. Lennox in proposing "The Guests," were Dr. English, president of the Illuminating Engineering Society, and Mr. Alger, manager of the Bournemouth and Poole Electricity Supply Co.

Research on Dielectrics

IN the Institute of Physics' *Journal of Scientific Instruments*, Dr. L. Hartshorn, of the National Physical Laboratory, discusses the properties required in dielectrics divided in three groups: (1) Those used for general experimental work, *e.g.*, for instrument panels: (2) those used for work at high frequency; (3) liquids or fusible materials for impregnation or as immersion media when various dielectric constants are required. By adding other ingredients to pure ebonite (*i.e.*, rubber and sulphur) materials have been produced which show comparatively little surface deterioration on exposure to light; an example is "Keramot." Among the moulded "plastic" materials described is "mycalex," a mechanically strong panel material which is capable of withstanding high temperatures; it consists of powdered mica bonded with borates of lead or sodium.

For high-frequency work two classes of materials are called for: (1) those in which the power loss per unit volume (*i.e.*, the product of dielectric constant and power factor) must be small, and (2) those for which the dielectric constant must be high and the power factor small. Hydrocarbon resins possess valuable dielectric properties. An example is polystyrene available commercially as "Trolitul," and "Styroflex." Trolitul is a clear glass-like solid, light in weight, of low dielectric constant and with a power factor which may be as small as 2×10^{-4}.

Under ceramics there are two distinct groups of new materials, the steatite and the rutile. The principal constituent of the first is magnesium silicate, which possesses a low power factor, especially at very high frequencies. The rutile group has been produced for the manufacture of small solid-dielectric condensers. Their principal constituent is rutile, a crystalline form of titanium dioxide which has a high dielectric constant.

Among liquids or readily fusible solids only the waxes, including hydrocarbons such as benzene, transformer oil, petroleum jelly and paraffin wax, appear to have good insulating properties. Liquids or waxes with a high dielectric constant and a low power factor are not easily obtainable, but certain halogen derivatives of hydrocarbons are good insulators and have a dielectric constant at least twice as high as the hydrocarbons.

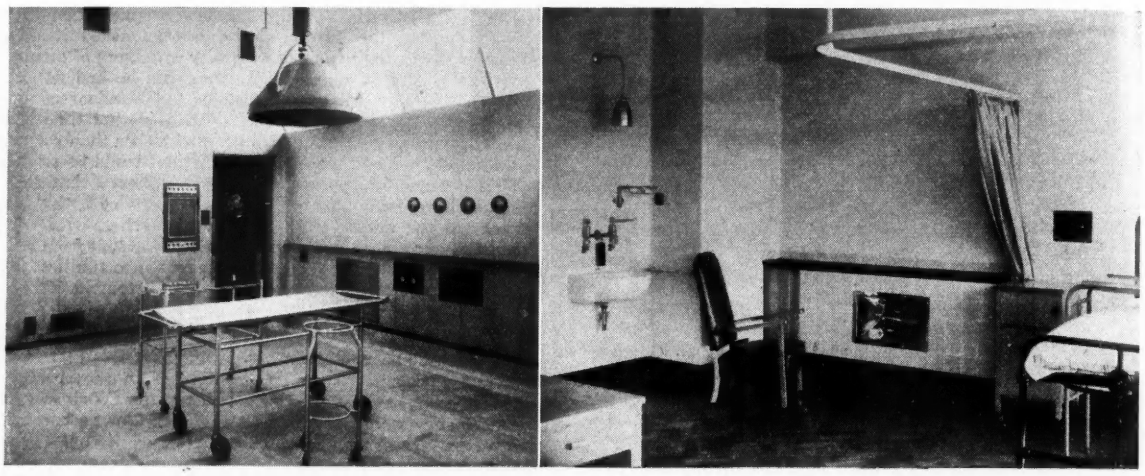
Electricity in a Hospital

An interesting new installation at a London institution

Good lighting and a sufficiency of power outlets for both treatment and research work are an essential part of the equipment of an up-to-date hospital.

NO building of its kind we have yet visited can boast more power plug-points in relation to floor area than the new extension to the National Hospital for Diseases of the Nervous System in Queen Square, W.C.1. Every single-bedded room has three and every four-bedded ward eight, while in one of the smaller research laboratories we counted as many as eleven, excluding the general and local lighting points. Actually for the 50,000 sq. ft. of floor area covered by the operating theatres, X-ray rooms, ward, research laboratories, &c., there are approximately 800 installed.

The reason for this apparent lavishness is the extent to which electricity is employed both for treatment and for research work, d.c. as well as a.c. supplies being required not only in the research laboratories but in every ward also. The multiplicity of plug-points in the operating theatre is further complicated by the necessity for providing low-voltage supplies for the surgeon's head lamps. For these, four points controlled by rheostats give any voltage required up to 40 V, the necessary transformers being concealed behind a wall panel. Incidentally, to guard against any risk of fire caused by sparks, all the switches used in the operating theatre are of the mercury type, with interlocked plugs.



Right: A corner of a ward at the National Hospital extensions, showing the compact bedside control unit and a Ferranti inset fire. Left: The operating theatre. Note the array of plug points, in particular those on the right for the surgeon's headlamp

A remarkably neat type of bedside control unit, made up to the design of the electrical contractors, Tyler & Freeman, is to be found in the wards. On a bronze plate measuring only 10 in. by 8 in. are mounted the bell push, the switch for the bed-light and sockets for radio, G.P.O. telephone, inspection lamp, &c. The centre lights in the wards are controlled by dimmers located outside the doors, where, too, in the case of the rooms occupied by the most serious cases, are master switches for the lights and electric fires.

The ward bell system is arranged so that a patient, besides operating a buzzer in the sister's office, switches on a red light outside the ward. This light can be extinguished only from inside the room. A Siemens automatic telephone system has been installed for inter-communication between various parts of the building and any particular member of the staff can be rapidly located by means of the Instanta combined clock and call system, the appropriate stencilled numeral on the dials being illuminated in red. This call system is linked up with that in the old building where, however, an existing audible signal system is retained. Seconds hands are fitted to the clocks in the operating theatre and research laboratories

Throughout the building every care has to be taken to secure adequate and suitable illumination and in all of the wards the beds have, in addition to the usual bedhead lamp, a second unit not more than a couple of feet away for inspection purposes. To obviate glare Troughton & Young "Louvrelux" fittings are employed largely in these positions. In addition to these units, central ceiling fittings and wall brackets over the wash basins are provided, G.E.C. and Troughton & Young equipment being mainly used. The totally enclosed units in the corridors are of two distinct types—spherical for the normal lighting and oval for the emergency system.

There is little fear of work being held up in the operating theatre by a failure of electricity supply. The main Zeiss unit installed incorporates a 150-W double-filament lamp with one filament on the a.c. supply and the other on the emergency system, a third source of light being available from the excellent general lighting which is on the d.c. mains. The emergency lighting which is operated on the Chloride "Keepalite" system, is arranged to come on if a failure occurs either in the main supply, the floor supply or in the lamp of the operating fitting. For extra rapid restoration of any standard lighting circuit in the theatres, in the event of a short circuit or overload, circuit-breakers (Nalder) have been utilised instead of fuses.

In the lecture theatre a group of selector switches is provided near the main entrance to enable any or all of the general lighting units (Zeiss), the spotlights for focusing on patients under examination, and the blackboard lighting to be utilised. The desired combination having been chosen, the lighting can then be controlled by push buttons from the blackboard or from the cinematograph operator's seat at the back of the hall or from any point of entry. Both the windows and the blinds are electrically operated, an interlocking system being provided.

A lighting intensity of no less than 50 ft.-candles has been attained in the post-mortem room from twelve Zeiss units housing 200-W lamps and spaced about 6 ft. apart, while nine Benjamin fittings with 200-W lamps 6 ft. apart give 30-40 ft.-candles in the dissecting class-room. Special trough reflectors have been designed for illuminating the museum specimens and blackboards.

Electric discharge lighting has been installed in the photographic room, where three 400-W "Osira" units have been fitted. In addition there are two reflectors with 1,000-W and 1,500-W tungsten filament lamps and two 200-W spotlights. The X-ray equipment has not yet been installed but several dark rooms have already been fitted with Ilford lighting equipment, plate viewing boxes, drying cabinets each with two 60-W Unity heaters incorporated and ventilating fans (London Fan & Motor Co.). A master switch is fitted outside each dark room, while inside there are special switches with neon indicators for showing their position in the dark or when the red light only is on. Kodak viewing cabinets are to be found in the operating theatre, lecture rooms, post-mortem room, &c.

Extensive use is made in the research laboratories of an ingenious portable pedestal device invented by Mr. E. H. Freeman, of Tyler & Freeman, and first installed at the Royal Veterinary College. Fitted with flexible leads and pipes, this "R.V." pedestal, as it is called, can be rapidly connected to service outlets in a special box in the floor of the room, and provides such water, electrical and other facilities as are required for the benches round the walls. When a central bench is not wanted the pedestal is easily removed and the services disconnected and an inconspicuous cover over the cavity gives a clear floor space.

Kandem adjustable and transportable units provide local lighting for the benches, many of which have supplies of compressed air available from a Lacy Hulbert compressor situated

in the basement. The private laboratories have "Engaged" signals outside operated by the closing of the door. Thermostatically controlled ovens and incubators (Chas. Hearson & Co.) are used for bacteriological work, while large York Shipley refrigerators enable specimens to be stored for a considerable time. The fume cupboards in the teaching laboratories are equipped with lights and Sturtevant exhaust fans.

Inset electric fires are provided in all the wards—1-kW Bratt Colbran models in the one-bedded rooms and 2-kW Ferranti units in the three-bedded wards. In addition, Richard Crittall & Co., Ltd., have installed invisible embedded panel warming throughout the building. This is fed from a new steam calorifier situated in the basement. The operating theatre, lecture theatres, sterilising and anæsthetic rooms have fresh air and extract ventilation systems. The fresh air supply, which is warmed by Heatrae heating elements inserted in the trunking, is automatically controlled by thermostats and magnetic valves.

Two 1½-kW Unity panel heaters fixed on one of the walls take the chill off the post-mortem room if the low temperature maintained there becomes unbearable. Tubular or panel heaters with thermostat control are also fitted in some of the rooms on the top floor where animals required for biological studies will be kept.

Special multiple food containers, sixteen in a unit, keep the patients' food warm after leaving the kitchens and the actual serving is done from Hotlock food trolleys, the ½-kW heating elements of which can be connected to 5-A plugs specially provided for the purpose on each floor. Waygood-Otis lifts comprise two passenger, one goods and one bed models.

Rising mains carried straight up through a centrally situated duct provide all services—normal and emergency lighting, power, clocks, inter-communication and G.P.O. telephones, radio, bells, &c., and they are arranged so as to simplify as far as possible any future alterations or additions. Henley cables and Walsall conduits have been employed throughout and nearly all the local switches are of Crabtree manufacture.

A somewhat unusual feature of the main intake room where the 230/400-V, 3-phase, a.c. and 200-V d.c. supplies are taken from the Metropolitan Electric Supply Co., Ltd., is that the bus-bar chamber is at the top of the main switchboard, the sub-mains from the metal-clad "Glasgow Rex" switch fuses passing out at the bottom. Constructed by Millns Electrical Co. the boards are exceptionally neat and there are no exposed cables to be seen. Statter circuit breakers control the main a.c. and d.c. supplies.

Also of interest are many other minor features of the installation, such as earthing contacts for X-ray departments, and circuits for connecting recording instruments in different rooms and so forth. The whole installation has been carried out to the design of the architects, Slater, Moberley & Uren, Mr. Morgan Davies is responsible for the X-ray equipment.

Trolley v. Oil Buses in Manchester

City Council defers decision

IN our last issue we were only able to mention briefly the result of the protracted debate in the Manchester City Council on September 7th on the proposal to abolish the tramways with its serious implications of loss to the Electricity Department. As we stated, the matter was referred to the General and Parliamentary Committee of the Council for a report to be prepared by January next, giving more information than was contained in the recommendations of the Transport Department.

The decision was only arrived at after a 44 to 44 vote. The Lord Mayor pointed out that it would scarcely be fair to settle a matter of such magnitude by a casting vote. Hence he turned the scale in favour of reference back.

In moving the adoption of the Transport Committee's report Sir Wm. Davy, the chairman, stressed one important detail—that actually the abolition of trams was decided on a year ago and that the Committee's recommendation was simply fixing a time-limit for that operation, and that all the Council had to do was to decide whether trolley or motor buses should be substituted. The meeting, however, would not restrict itself to this narrow issue, but brought in a number of wider questions, such as the loss to the Electricity Department and the ratepayers; the importance of using home-produced fuel as compared with imported oil in time of national emergency; and the co-related subject of employment for British coal miners.

Electricity Department's Loss

Sir William admitted that the proposal would have an adverse effect on the Electricity Department but presented it in his own way, thus: Last year's output showed an increase of 34,200,400 kWh, which was about equal to the £52,345 which the Department would lose by the scrapping of the trams, implying that the loss would be made good by the normal continued expansion of output. He did not state whether the 34 million extra kWh included any added consumption by trams and trolley buses. He maintained that some routes were unsuitable for the trolley buses. They had been discussing this matter for four years. The Transport Committee had had a meeting with the Electricity Committee and he thought that he had convinced them of the serious difficulties connected with running trolley buses. "We conceded them two more routes: we felt we might do so without endangering the stability of the undertaking."

Councillor Dawson, a member of the Electricity Committee and vice-chairman of the Finance Committee, in proposing that the scheme should be referred back to the Committee, said that the present proposal was to accelerate the abandonment of trams which was decided upon last year. The report set out clearly what the Transport Committee wanted—the order of conversion to be left with them, and tenders to be obtained for rolling stock. For the Transport Committee the clear issue was electric trolley-buses or motor buses. A few days before the meeting members of the Council received nearly 2,000 pages of printed matter to read, not including the financial abstract. It was impossible for all that matter to have been studied adequately in the time. He did not suggest that the loss to the Electricity Department would be crippling, nor that it would increase the cost of electricity to consumers, but that it would be likely to delay a decrease. He laid stress on one phrase in the report: "The policy of abandonment is justified on financial grounds so far as the transport undertaking is concerned," another paragraph pointed out that there were other financial considerations besides electricity, such as the Highways Department, as regards abandonment of track. The Electricity Committee must feel, as one of the biggest electrical undertakings in the country, that it was entitled to put forward its case as to how the report affected its interests. The loss to the Electricity Department would be £104,000 per annum when abandonment was complete. The Highways Committee would be affected to the extent of £21,000. Then during the last nine years the Transport Department rates had decreased by £55,000—that had to be provided by the ratepayer. Besides that sum, the report added for redemption a further £11,000 or £12,000. Councillor Dawson contended that one of the trolley bus routes in Manchester was particularly difficult yet the report made a comparison with oil buses running on a wide straight highway. Trolley buses would take 68 passengers against 56 in the case of oil buses. Ministry of Transport figures gave the average cost of running trolley buses as 12.87d. per mile, and if the Manchester figure of 16.07d. were accurate there was something wrong with Manchester trolley buses, and that difference should be investigated.

Councillor Wright, who seconded the reference back, complained that comparisons had been made with towns in which conditions were entirely different.

"Misleading and Biased"

Councillor Breeze described the report as misleading and biased against the trolley bus: it said buses would cost £865,000 as against £1,118,000 for trolley buses, but the latter carried 68 and oil buses 56, so that five trolley buses would be equivalent to six oil buses. He maintained that the speeds should be considered equal. Trolley buses were more easily controlled, had rapid acceleration and were quieter.

Councillor Arthur Moss, referring to the action recently taken by the Coal Utilisation Council, said that "adversity brings us strange bedfellows." He contended that electricity had done more harm to the coal industry than transport was ever likely to do, and he asked the Council to accept the Transport Committee's report.

Sir Wm. Davy in his reply said that the opposition was only an appeal by the Electricity Committee to delay decision. Money was being lost on the trams—£24,000 recently, and that must not go on. A decision must be arrived at about trolleys or motor buses. What could the General and Parliamentary Committee do? Manchester was surrounded by half-a-dozen other towns; several of them were against trolley buses. The chief opposition was from people who feared that they might lose some money by it. As to war, there was five years' supply of oil in this country; whereas one bomb on the electricity station would put the whole installation out, it would take more than one submarine torpedo to stop oil supplies coming to Great Britain.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Insulating Small Motors

WITH reference to a letter from Mr. F. W. Roberts which appeared in your issue of September 2nd upon the above subject, there is undoubtedly a great divergence of opinion on the subject of the correct treatment of coils wound with enamel wire. Personally, I think by far the best method is to carry out some form of varnish treatment. The reason for this is two-fold, because insulating varnish fulfils a double function in rendering a winding more stable from both the electrical and mechanical points of view.

In the case of enamelled wire the designer may consider the actual enamel sufficient for electrical insulating purposes, but the fact that enamelled wire sometimes contains certain breaks in the continuity of the film (known as "pinholes") makes the application of an insulating varnish an additional safeguard. As far as mechanical considerations are concerned, there is no question that the varnish renders the coil far more solid and enables the winding to withstand the effects of vibration, &c., to a much greater extent than an untreated one. It is, of course, essential to use a reputable insulating varnish which will have no solvent effect on the enamel on the wire. R. T. FLEMING.

London, S.W.1, *September 8th.*

Driving Earth Electrodes

Mr. Taylor states the E.R.A. tests with electrodes showed no evidence of insulating gas films produced by small alternating currents, but he does not say whether the electrodes under test were driven several feet into earth. What happens to the gases produced by electrolysis when an electrode is embedded in clay which prevents the gas from escaping? The space occupied by the gases would, apparently, separate the clay from contact with the electrode surface; in this event the gases would form an insulating film.

A further point is that while the earth at a depth may remain moist when the upper soil surface becomes dry, pure water is a non-conductor. The deeper the surface water seeps, the purer it becomes by filtration and consequently less conductive. The effect of a small a.c. will be indicated by the following test I made about two years ago with the object of finding out if the resistance of the circuit through the soil could be lowered by electrolysis of the electrode causing the metal to enter into solution in the water conducting the test current.

A sample of wet soil was connected in the circuit of an a.c. trip coil requiring about 30 mA to energise it, and about 50 V was applied to the sample and coil in series. A half-wave rectifier was then included in the circuit and about 5-mA unidirectional impulses were given which would not energise the trip coil. A very rapid increase in resistance occurred until finally a 230-V a.c. supply connected across the soil and trip-coil circuit could not energise the trip switch.

The test was repeated in water with no effect, so it occurred to me that the soil fibre might have some effect and to avoid complication due to chemicals which might be present in the soil I added cotton wool to the sample of water. The effect was the same as with soil, the resistance increasing to a "sky-high" value. Cleaning the surface of the test electrodes had no effect on the resistance of the circuit. The resistance could be lowered by reversing the direction of current, but it would first fall to its original value and then build up again. Unrectified a.c. had no such effect. The effect was the same when gelatine and the like were employed instead of cotton wool, and also when salts were added to the water, the only difference being that with a given test current a longer period was required to build up the resistance when the water had a higher proportion of dissolved salts. Finally, when the resistance had been built up a litmus test at the cathode showed the water to be strongly alkaline.

If the alkaline water were drawn off and a new conductivity test made, its resistance was very low, but after a few hours the resistance would increase and the alkalinity would disappear.

Now if an electrode is driven deep into clay which remains moist when the surface soil has become dry and non-conductive, a persisting small leakage or capacity current might have the same effect as in this experiment. The alkalinity could cause corrosion at the electrode surface, resulting in a rectifier effect until the electrode was finally isolated due to the moisture close to it ceasing to conduct. This trouble would not be experienced while the surface soil remained moist, but once the lower depth of the electrode became active the filtered water would cease to conduct. Relays depending on such an electrode would be erratic and under practical conditions the reason would be difficult to trace.

In my view electrodes will be reasonably reliable up to some resistance limit yet to be determined, say, 200 ohms for earth leakage trips, but above that value they are uncertain.

Liverpool, *September 12th.* A. G. BULLEN.

Employers and the I.E.E.

It puzzles me to know what "W. E. L." would regard as essential qualifications for admission to membership of a new organisation of "dyed-in-the-wool" electrical engineers which he aspires to found. Be they merely regular training and employment in the industry, then presumably the M.I.E.E., who in "W. E. L.'s" opinion blundered over the question of using an 85-cycle motor on a 50-cycle supply, could furnish all the necessary qualifications for election in the suggested new organisation.

If, however, "W. E. L." would supplement these qualifications by an examination or treatise to check whether an applicant has worked his way by merit or bluff, then it would appear that his would-be conditions for membership are already satisfied by the I.E.E. as it exists to-day.

"W. E. L.'s" first contact with an M.I.E.E. occurred nineteen years ago when corporate membership of the I.E.E. was practically open to any person who could produce evidence of regular training and a subsequent worthy job in electrical engineering. Those who so joined the I.E.E. have retained their status, but employers may take into account the manner in which a prospective employé has obtained his A.M.I.E.E. or M.I.E.E., and in fact this is done by the selection committees of Government Departments. P. HUGGINS, A.M.I.E.E.

Sale, *September 12th.*

It would appear from his letter in your issue of September 9th that because some people are unable to conform to the high standard of technical ability demanded before Associate Membership of the I.E.E. can be obtained "W. E. L." considers an association of "dyed-in-the-wool" (whatever that may mean) electrical engineers is necessary, presumably with less stringent qualifications for membership.

The I.E.E. is acknowledged by the leading engineers of this country to be one of the premier institutions, and membership of it is an honour which, judging by the list of members and the number of candidates willing to devote both time and money in attaining the required technical proficiency, is highly prized; it is futile, therefore, to suggest that these engineers are not what they profess to be.

What is really required is for the electrical profession to attain the same status as the medical, dental, and legal professions, and prohibit all who are not qualified from calling themselves "electrical engineers." At present any garage proprietor or jerry wireman can call himself an electrical engineer, and so long as this is permitted the public will not trouble to differentiate between the true engineer and the parasite.

It is fully time that the electrical profession was given its proper place, on the same plane as the medical and legal professions, then the Chartered Electrical Engineer will attain the status to which he is entitled, and the "magic letters" A.M.I.E.E. will convey to employers and the public that a very high standard of technical proficiency has been reached.

September 10th. A.M.I.E.E.

The Colliery Electrician

MR. JESSE MANN, chief electrical engineer of Henry Briggs' Collieries, the new president of the North West Yorkshire Branch of the Association of Mining Electrical Engineers in his presidential address at Wakefield on Sept. 10th, referred to the growth of the Association, and especially of the Yorkshire branches. He said that the time was not far distant when compulsory certification of colliery electricians would be an accomplished fact in Great Britain. The importance of the examinations held by the Association for certificates of competence would, therefore, become much greater. It was up to the mining electrical engineer of to-day to prove that, given the right plant and personnel, both of which were readily available, the use of electricity in mines could be perfectly safe if combined with proper facilities for systematic maintenance.

Alloys for Electrical Construction

In the article by Mr. L. B. Hunt on this subject in our September 2nd issue, the sentence above the sub-heading "Strength and Wear Resistance" should have read:—"Castings in this material have a high resistance to fatigue for example, while the high impact strength is retained to a great extent at elevated temperatures, not falling below 50 ft.-lb. even at 400 deg. C."

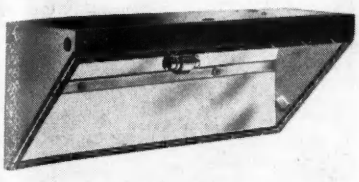
New Electrical Products

A review of equipment recently marketed

Show Window Lighting Trough

FROM BROWN BROTHERS, Ltd., Great Eastern Street, London, E.C.2, we have received details of a new shop window trough marketed under the trademark "Duco."

Simplicity of fitting is the main feature of this reflector which, known as "Model EF53/89," accommodates two lamps up to 150 W, placed cap to cap in a double-ended bayonet holder, the light being reflected by a system of mirrors arranged to give correct light value.



The "Duco" shop window trough

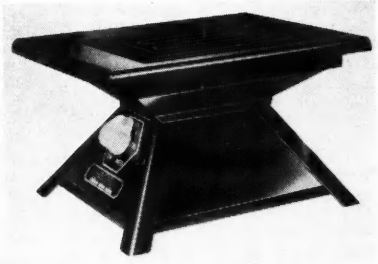
Instead of being suspended, the trough is designed for mounting direct into the angle between wall and ceiling. Conduit entry holes are provided at each end and the back of the trough forms a convenient wiring channel. The spacing of the troughs can be varied to suit any shop window and the spaces between covered with ply-wood or a similar material. In this way the conduit fittings are concealed and the whole job presents a modern built-in appearance.

In cases where the face of the fitting is seen from the shop interior, as in a motor showroom, an obscured glass screen can be supplied at a slight additional cost, a channel on the body of the trough allowing the cover glass to be slipped on.

Rapid Boiling Plate for Counter Work

A rapid boiling plate complete with a suitable stand for use on counters is being manufactured by the JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, London, S.W.1.

The boiling plate is the latest "Backer-Jackson" model which has the advantages of the radiant type plate while being fully protected from damage by liquids and utensils.



The "Backer-Jackson" boiling plate for counter work

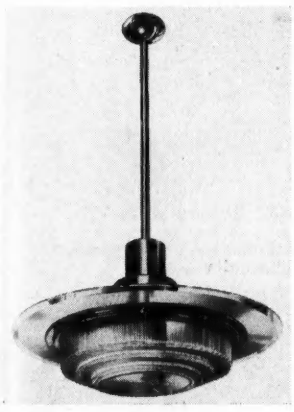
The boiling surface is 8½ in. by 6 in., with a loading of 2 kW and the hob surround provides accommodation for two or even three utensils at one time.

The boiling plate is controlled by a four-heat switch mounted on the stand, which enables different types of operations to be carried out according to the speed desired.

The unit is compact and measures approximately 7 in. high by 13¾ in. deep by 10⅜ in. wide, including the hob surrounding the boiling plate.

Lighting Fittings

For the coming lighting season HOLOPHANE, LTD., Elverton Street, Vincent Square, S.W.1, has completed its range of "built-in" architectural lighting fittings, which have been specially designed to suit the modern style of architecture. They incorporate the "Controlens" glassware and the range now comprises units to suit the requirements of different-sized buildings from the small residence to the largest public building. The models available for shop-window lighting are of particular interest.



The Holophane "Steplite" disc fitting for general lighting

Another development, the "Steplite" disc fitting No. 9479, is a central band suspension type pendant, suitable for a 200 W lamp. It has a decorative glass disc surrounding the general lighting unit, and it is designed to suit modern interiors. Colour sprayed, natural bronze and chromium finishes are available.

Welding Steel to Cast Iron

BARIMAR, LTD., 14-18 Lamb's Conduit Street, London, W.C.1, has devised a new process for welding together steel and cast iron, amalgamation between the two metals being secured by a special ferrous feed rod.

This new process is capable of numerous applications. For instance, it is practicable to produce the crankcase of an internal-combustion engine in cast iron minus the main bearing housings and their supports, fabricate the housings of steel and then weld them to the sides of the crankcase. This method can also be used when the main bearing housing and its support have been smashed by a broken crankshaft and new parts have to be welded in.

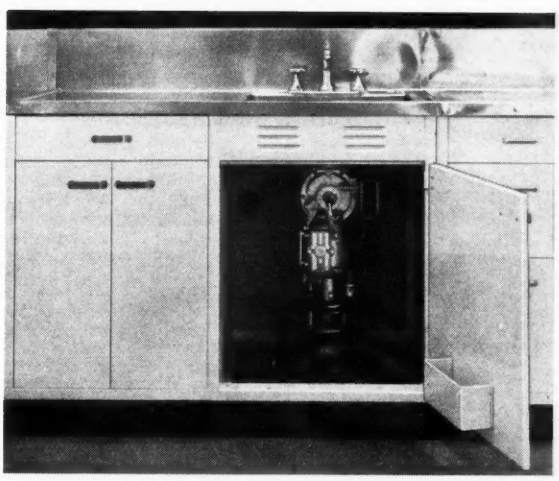
Welding steel to cast-iron by the new Barimar process

It takes less time to fabricate a new bearing housing support and weld it in than to make a pattern and cast a new part, so that there is considerable saving in cost and delivery time.

The accompanying illustration shows the support of a main bearing housing being welded to a crankcase in the Barimar works, while another fabricated part is ready for welding in position.

A Refuse Disposal Machine

Full details of the "Disposall" house refuse disposal unit, to which we have already made reference, have now been received from the makers, the HOTPOINT ELECTRIC APPLIANCE CO., LTD., 24, Newman Street, London, W.1. The machine is designed for connection to the outlet of the kitchen sink and at the foot of a receptacle for holding the garbage there is an impellor driven by a vertically mounted capacity start motor. The impellor dashes the garbage against a hard steel cutting edge in the wall of the receptacle, and reduces it to shreds.



The Hotpoint "Disposall"

While the machine is operating the cold water tap should be running. The water carries the shredded portions of the garbage into the lower fly-wheel chamber where it is further sub-divided and then from there carried into the main drain. The actual size of the particles is small—about that of oatmeal. The machine, which is self-cleaning, acts rapidly and efficiently and will deal with most garbage, but it will not deal with bottles and tins and should not be used for large bones due to the time taken to dispose of them. Hot water should not be used when the machine is operating since it tends to melt the fat and makes disposal more difficult.

E

Positive Action Pear Switch

Both walnut and white "Duroid" are available for the new "Efesca" shockproof pear switch which is being marketed by FALK, STADELMANN & CO., LTD., 83/93, Farringdon Road, London, E.C.1. The mechanism is claimed to be unusually robust and a positive action is employed.

The "Efesca Duroid" pear switch

Water Heaters for Barbers

With reference to our remarks on page 358 of the September 9th issue, ARCHIBALD LOW ELECTRICS, LTD., Motherwell, Lanarkshire, point out that they have made water heaters for barbers in 1½- and 3-gal. sizes for a number of years with a loading of 2 kW as it was found the standard loading was too low to meet barbers' requirements.

Small Adaptors

G. TURNOCK, LTD., 41, High Street, Aston, Birmingham, 6, have recently introduced two adaptors of unusual design. The first is a b.c. type, the two half segments being clamped together so that children or inexperienced users cannot expose the flex connections, as is possible with the screwed cap connector. Cross ribs are provided inside to form a cord grip.

The second is a 2-A 2-pin b.c. adaptor enabling a 2-A plug to be operated off an ordinary lampholder. An upturned flange prevents one pin from being inserted on the live side with the other overhanging the edge. It also prevents the user from touching the pins while they are still in contact with the sockets.

Industrial Vacuum Cleaners

BYLOCK ELECTRIC, LTD., 109, South Street, Ponders End, Middlesex, has recently introduced two industrial type vacuum cleaners, a portable model and a pack model.

The pack style has a loading of 400 W and weighs 18 lb., being fitted with straps to enable it to be carried on the operator's back. The motor has a triple screw turbine fan, is rubber mounted and has all metal parts fitting into bakelite, the air displacement being 100 cu. ft. per minute.

The portable model is mounted on wheels and is fitted with two ¼ h.p. motors rated at 700 W.

Accessories for cleaning furniture, picture rails, &c., are included and 25 yd. of flexible cable is fitted.

The "Bylock" pack model

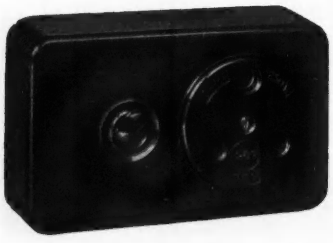
New Lamps

The NELSON LAMP CO., 5, Division Street, Sheffield, is the sole distributor in Great Britain for the new "Leader" gasfilled lamps. Guaranteed for a thousand hours and entirely British made the lamps are available in clear, pearl, opal, daylight or colour-sprayed types for both standard and non-standard voltages. Anti-vibration lamps for traction and factory purposes, &c., are specially designed to withstand rough usage.

Shutter Pattern Switch Sockets

A special shutter system is used in a new range of switch sockets introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. On inserting the plug the earth pin pushes aside a small spring-loaded bar which opens the shutter covering the line and neutral socket tubes just in time to receive the respective plug pins.

The switch must be in the "off" position before the plug can be inserted and, should the plug be withdrawn while the switch is still "on," the shutter covers the line and neutral tubes instantaneously. Simultaneously, another spring-loaded shutter covers the earth tube, thus preventing the reinsertion of the plug until the switch is tripped to the "off" position.



A G.E.C. surface pattern shuttered switch socket

The switch and socket mechanism is mounted on a solid vitreous porcelain base. All interconnections between switch and socket tubes are made by means of solid copper strips, fitted into deep recesses filled with hard wax. The wiring terminals are mounted on the front of the porcelain and are therefore readily accessible. A robust moulded bakelite cover is fitted and knockouts are provided for where surface wiring is employed.

The switch sockets are made in flat top, handshield (to B.S.S. 372, Part II) and finger grip patterns, and are supplied complete with plugs, although any three-pin plugs manufactured to British standard gauge are interchangeable. The three patterns are available in the following:—Single-pole, 2 A, 5 A and 15 A; and double-pole switch sockets rated at 5 A and 15 A.

Electric Iron for Travellers

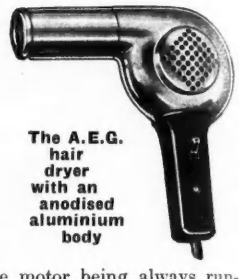
A newcomer to the range of "Swan" irons made by BULPITT & SONS, LTD., Swansea Works, 158, Camden Street, Birmingham, is the "Cruiser," which has been introduced for use in hotels, boarding houses and steamships, &c. The loading is 300 W, the weight 3½ lb., and the iron is suitable for voltages of from 100 to 250.

The "Cruiser" iron

A sloping handle is fitted and the cable enters the connector at an angle. The three contact pins are so arranged that by fitting the connector to the two left-hand pins the iron is suitable for 100/110-V supplies, while connecting up to the two right-hand pins makes it suitable for 200/250V circuits. A special plate covers the pin not in use and thereby prevents danger of a short circuit. The iron is supplied complete with a carrying case which is equally useful for the purpose of storing the iron.

Domestic Appliances

An extensive new range of domestic electrical appliances is being marketed by the A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1. Among the most interesting items are the "Express" water heater (which is claimed to boil four pints of water in under ten minutes), an iron with a sprung back-rest and button grooves, and an all-insulated vacuum cleaner. An exceedingly hard composition material is used for the body of the vacuum cleaner.



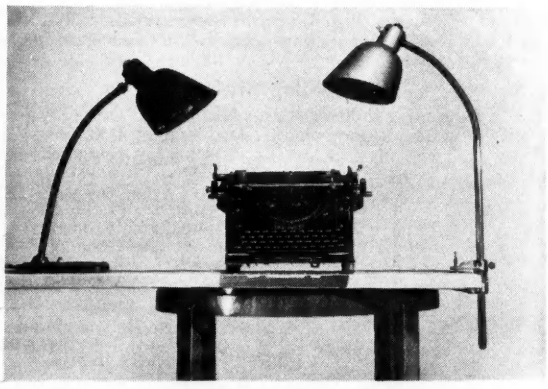
The A.E.G. hair dryer with an anodised aluminium body

A novel feature of a hair dryer is that the switch incorporated in the bakelite handle controls the heat only, the motor being always running when the apparatus is on circuit. The light anodised aluminium body can be finished in a variety of pleasing colours. Portable and bowl fires, heating pads, soldering irons and glue pots are also included in the new range of domestic appliances.

"Daylight" Desk Lighting Fittings

To the range of "Day-spect-ray" daylight spectrum lighting fittings marketed by ERNST GEISEL, 118-20, Great Titchfield Street, London, W.1, have just been added an adjustable desk standard and a typewriter unit.

To permit the light to be projected at any angle the former is provided with two ball joints, another feature being an exceptionally heavy cast-iron base in which is a pin tray and a switch with a very smooth action. The unit, which is 19 in. high, can be supplied in any colour.



The "Day-spect-ray" daylight desk and typewriter lighting units

The typewriter unit can be fixed on a wall or table. A screw-on bracket gives adjustments for height and direction, and the top part of the fitting is of flexible tubing. A press switch is provided in the hood.

The daylight effect is produced not by tinting the reflectors but by the crystalline structure of the glass which composes them. All the metal work is British made.

London J.E.A. Charges Increased

Commissioners have their way

ON Monday last at a special meeting the London and Home Counties Joint Electricity Authority adopted recommendations by its Finance Committee to increase its charges for electricity and cooker hire and to institute meter rentals for two-part tariff consumers. The recommendations were based on a report by a sub-committee appointed to investigate costs in view of the Electricity Commissioners' insistence that the Authority's accounts for 1940 should not show an adverse balance. The matter has previously been commented on in our pages.

The sub-committee repeated the statement that the deficits which have been incurred in recent accounts have been due to the fact that the Authority is compelled to repay its loans at an unduly high rate. In the discussion on the report, however, Mr. W. A. Pearman pointed out that the rate of redemption was the same as for all municipal authorities. The answer of the Chairman of the Authority (Ald. J. Chuter Ede) to this was that a considerable proportion of the loan charges was represented by the purchase of apparatus for hire which longer-established authorities were able to purchase out of surpluses.

Heavy Loan Charges

The sub-committee pointed out that at December 31st next, after five full years' trading, the Authority would have incurred a capital expenditure of £5,700,000 and would have provided out of revenue a redemption fund of approximately 20 per cent. of that figure. It was estimated that by December 31st, 1945, the redemption fund provided out of revenue would be not less than 50 per cent. of the then capital expenditure. The loan charges for the current year amounted to £124,500 out of a total expenditure for the year of £1,128,500.

As stated above, a considerable portion of the loan charges are in respect of apparatus for hire, expenditure upon which must be redeemed in seven years. For the purposes of the revised figures submitted with the report the committee assumed a redemption period of ten years for future expenditure as it understood that the extended period would be favourably considered by the Commissioners. The provision of meters, loans for which must be repaid in ten years, forms a considerable proportion of the expenditure and the redemption of the capital raised for the purpose of acquiring the original undertakings is also a heavy burden.

Other considerations which had to be borne in mind were the increase in the costs of bulk supplies purchased by the Authority (£32,000 in the current year) and the change of the financial year to correspond with the calendar year, which was said to have led to a temporary deficit of £46,000, which formed part of the total accumulated deficit.

The Committee's investigations were not yet completed but to enable it to submit revised estimates meeting the Commissioners' requirements it proposed the following alterations in charges: An addition of 10 per cent. on all electricity supply accounts, the addition to be applied to accounts for electricity consumed after the date of the readings of meters for the third (September) quarter, 1938, until further notice; a charge at the rate of 10s. per annum to be made for all two-part tariff meters to take effect in the case of existing consumers immediately after the date of the reading of the meters for the third quarter, 1938; and that the rents charged for all cookers hired after August 10th, 1938 (other than Jackson 51J cookers) be doubled and that the minimum period of rental be three years. (This means that for the three types of cooker concerned the quarterly rents will be 8s., 10s. and 20s.

With reference to the increases in cooker rentals Mr. D. J. Bolton, M.I.E.E., proposed that when a consumer had had a cooker three years the rent should revert to the former rate. He considered that this would encourage the consumer to keep his cooker in good order and save the Authority a good deal in maintenance costs. There was no seconder to this motion, which was therefore not proceeded with.

A member said that he did not entirely agree with the recommendations and did not take an optimistic view of the prospect. Another member considered that the increases in hire charges were too great and he would like an assurance that they would not have the effect of restricting the development of the cooking load upon which the success of the undertaking largely depended.

Still Competitive

Ald. Davis, Chairman of the Finance Committee, said that the Committee had taken this into account; 125,000 existing consumers would not be affected. The charges would still be competitive with gas charges and when the situation improved they would be revised.

The revised estimates appended to the report showed that a deficit of £109,500 (raising the total to £153,500) was anticipated from the current year's working. From 1939 to 1943 a surplus rising from £9,500 to £69,000 was expected, the latter amount wiping off the accumulated deficit then existing. The loan charges in each of the years would range from £460,500 to £499,000 out of a revenue rising from £1,211,500 to £1,515,500.

The authority approved the report and recommendations without amendment.

Distribution Changes

By G. V. Harrap

AMIDST all the discussion on the present and future position of electricity distribution, little account seems to be taken of discussions and discontents elsewhere. Papers and articles there have been in plenty, describing the technical and administrative conditions in New Zealand, Northern Ireland, &c. These have not included as a main feature, the reorganisation of distribution, but have dealt with the development of the schemes.

The following extract from the A.I.E.E. *Journal*, Vol. 55, p. 75, shows that we are not the only ones who are groping towards increased efficiency and better service:—

> "The distribution system of electric supply offers a fertile field for 'modernisation.' It is characteristic of distribution that its earlier practices grew largely from 'practical' solutions of the problem of getting service to the customers, rather than from careful engineering study. The present widespread interest in distribution costs indicates a recognition of the large amount of capital tied up in the distribution system and the opportunities for improvement and economy. Unfortunately, the idea seems to be somewhat prevalent that distribution engineering has been backward and that improvements in distribution are to be looked for in some radical changes which are 'just round the corner.' On the contrary it is fair to say that distribution engineering has kept pace with engineering in other lines, and that any system can be thoroughly modernised by practices now available which have been tried out by some of the industry. Future improvements are to be expected, of course, but major changes of a revolutionary character are not to be anticipated, at least in the near future."

While taking cognisance of the above, it should be appreciated that distribution systems in the U.S.A. are operated by public utility companies covering very large areas. Even though distribution authorities be formed in this country, having areas comparable with those of the Joint Electricity Authorities and power companies, yet the cure is not complete. The formation of such authorities would eliminate some superfluous administration and overhead charges, but the American opinion shows that even with larger administrative areas no major changes of a revolutionary character are to be expected in distribution technique.

Relaxations in legislative requirements, P.O. restrictions, &c., may promote a definite expansion in some phases of distribution. Mr. W. Fennell has elaborated this aspect of supply in his I.E.E. paper, Vol. 77, p. 663, and in his recent address, Vol. 78, p. 18. But when all things are considered, the main changes must be in administration. Let us hope that any new or expanded bodies which may be created do not exhibit the faults inherent in large combines, and that they will keep in mind the larger aspects of public service.

New Mercury Lamp

A NEW 1,000-W mercury-vapour lamp for use commercially has been evolved by the General Electric Co of America and the Westinghouse Electric & Manufacturing Co., states *Reuter's Trade Service*. It is composed of a quartz tube the size of a cigarette, containing a globule of mercury and a trace of argon gas. A water-jacket of glass or quartz for cooling by circulating three quarts of water a minute prevents the inner quartz tube from melting. It also filters out the heat-producing rays, but allows the passage of practically all the ultra-violet radiation. The lamp is about twelve times as brilliant as a filament lamp of the same power and the small arc stream allows great accuracy in focusing, so that the new lamp can be used to great advantage in photo-engraving work, blueprinting, photo-enlarging, searchlights and therapeutic applications.

The Situation in Argentina

Increasing electrical demands

A SHARP upward turn in the economic fortunes of Argentina was already assured when the year 1937 opened, states Mr. S. G. Irving, C.M.G., Commercial Counsellor, H.M. Embassy, Buenos Aires, in his report on economic and commercial conditions in Argentina, prepared for the Department of Overseas Trade (Stationery Office, 3s. 6d.). It was not to be expected, however, that the extraordinarily favourable combination of circumstances in 1937 would be immediately repeated, and the rainless period late in the year, together with late frosts resulted in the smallest cereal crop for fifteen years, excepting 1935-36. The full effects of this misfortune belong to 1938, and did not prevent the year in which it occurred from being, in certain aspects, the best on record.

The speed with which the shipments were made in the early months created a new high figure for the country's trade balance before the effect of the consequent increase in purchasing power became discernible in the imports, and although during the second half of the year the favourable monthly balance dwindled until in November and December it gave way to a deficit, the year ended with a surplus 39.6 per cent. larger than in 1936, while exports and imports were each higher by just under 40 per cent. At the same time national manufacturing industries largely increased their production and general activity in all branches of national life was proportionately increased.

Increased Demand for Electricity

Very few new generating plants of importance were installed during the year, but a certain number of small Diesel generating units were purchased by various Government Departments, the orders going to Continental firms who underquoted their United Kingdom competitors while also offering extended terms of payment. All the power companies were actively engaged in making new connections and extending mains to new zones, particularly for the service of developing industries. In spite of these extensions, however, the companies appear to have had sufficient plant to meet the increased demand, as few orders were placed during the year.

Industrial development and the growth of urban population are reflected in the steady upward trend in the amount of electricity generated by the two companies which not only supply the Federal capital, but account for roughly 70 per cent. of the total current consumed in the country, their combined production in kWh in each of the past four years being as follows:—

	Millions of kWh.			
	Private Lighting.	Public Lighting.	Power and Traction.	Total.
1934	317.6	43.2	839.1	1,199.9
1935	322.2	41.0	883.4	1,246.6
1936	348.5	40.2	957.1	1,345.8
1937	274.4	47.6	1,124.6	1,466.6

In 1937 commercial lighting is, in the case of the larger producer (Cia. Argentina de Electricidad), included in the figure for "Power and traction." The total production of all power companies in 1937 amounted to 2,016 million kWh, as against 1,644 millions in 1936.

Popularity of Electrical Appliances

The general prosperity experienced in Argentina in 1937 was reflected in larger purchases of electrical goods, and on occasions the demand for many lines exceeded the available supplies. Constructional activity increased with the erection of numerous important buildings, both public and private, requiring large quantities of electrical equipment, while in addition to the many new factories several old ones were extended. Though the partial failure of crops at the end of the year led to the suspension of much new business the constructions already authorised, together with the increasing popularity of electrical appliances, should serve to sustain the consumption of electrical goods as a whole until the approach of the next harvest. If that is satisfactory a revival in demand is anticipated.

United Kingdom manufacturers participate very little in the supply of material required in connection with electrical installations owing to the general use by this market of cheap types not produced in the United Kingdom. It is therefore the more regrettable that they have lost business in the heavier types of plant on account of increased prices and long deliveries. Competitors have also raised their prices, but not to the same extent.

There was a substantial demand for electric motors and other equipment required for the development of a number of new local industries. United Kingdom manufacturers obtained a good share of the available business owing to the exchange difficulties experienced by some of their competitors. Some important orders were placed for standard sizes of static transformers and house meters, but in most cases United Kingdom prices were not competitive.

The sale of domestic electrical appliances improved appreciably, and in spite of the price advantage of at least 30 per cent. enjoyed by locally made articles, the turnover of imported appliances, mainly from the United States and Germany, showed a satisfactory increase, a large section of the public preferring to pay the difference for the better quality imported product. The local manufacture of dry batteries having been recently commenced on a large scale imports will soon be reduced to small quantities.

The Radio Industry

There are no official statistics of the actual number of radio sets in operation in Argentina, but taking into account on the one hand the sets imported and making, on the other, an allowance for those constructed locally, it is estimated that the total is approximately 1,200,000. Until a few years ago most sets were received from abroad, particularly from the United States and Holland, but then local manufacturers began to build sets from imported parts and to-day the trade is almost completely dominated by the local industry, high Customs duties preventing the importation of high grade receivers in any quantity.

United Kingdom receiving sets have hitherto had only a limited sale in this market owing to their high prices. The imports of radio accessories is increasing rapidly, but United Kingdom manufacturers who used to have a fair share of this trade have lost most of it to their German and United States competitors on account of price.

The consumption of electric wires and cables of all descriptions went up in 1937, and United Kingdom manufacturers took a reasonable proportion of the orders in spite of keen competition from the Continent and the increased production of two local factories. Although a few refrigerators are still imported complete, most firms bring in the parts which they build in locally made cabinets. The trade is steadily growing as electric refrigerators are being fitted in all modern flats and houses, the imports in 1937, including parts, largely the latter, amounting to 1,701,310 pesos as compared with 900,602 pesos in 1936. The bulk of the imports came from the United States.

Business in the telephone industry in 1937 was very satisfactory and further improvement is expected in 1938. The Union Telefonica del Rio de la Plata, which has 90 per cent. of the total subscribers in the country, installed ninety-one new physical and sixteen new carrier circuits, opened five new offices, modified ten and improved the facilities at nearly fifty others. Their outside plant also was considerably extended.

Junior Institution of Engineers

AMONG the arrangements of the Junior Institution of Engineers (Inc.) for the forthcoming winter session which opens on October 7th are the following: Informal discussion on "The Status, Qualifications and Remuneration of the Engineer," to be opened by Dr. H. Chatley (October 28th); paper on "Design and Construction of Electric Furnaces," by Mr. C. E. Ward (November 18th); paper on "Some Applications of the Thermionic Valve other than for Wireless Purposes," by Mr. H. J. N. Riddle (December 2nd); induction of Sir Charles Bressey as president, at R.S.A. headquarters (December 9th); "Demonstration of Modern Television Apparatus," by Mr. H. J. Shaw (January 20th); lecture, "Layout and Electrical Equipment of Swimming Pools," by Mr. C. N. Bond (February 3rd); and a symposium of papers on "Factors Contributing to Comfort in Travel," to be presented at a joint meeting with other Institutions (March 10th).

Sanitary Inspectors Discuss Air Pollution

At the annual conference of the Sanitary Inspectors' Association in Edinburgh, September 5th to 10th, the Ministries of Health and Agriculture were officially represented, while Mr. B. Wylam, chief alkali inspector, Department of Health for Scotland, read a short paper on atmospheric pollution for which he said the domestic coal fire was largely responsible. The several ways in which sulphur and grit are being extracted from the flue gases of electricity generating stations and industrial works by means of electrostatic precipitation and washing were briefly referred to.

The Leeds Electrical Club

The annual dinner of the Leeds Electrical Club will be held on November 9th, at the Victoria Hotel, Leeds.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Municipal Trading at Eastbourne

At a recent meeting of the Eastbourne Corporation Electricity Committee the Town Clerk reported that with regard to the sale of electrical fittings a deputation from the Eastbourne Branch of the Electrical Contractors' Association had been invited to attend before the Committee. The Committee interviewed the deputation, which expressed the thanks of the Branch to the Committee for having the matter of direct trading by the Electricity Department referred back for a discussion with the Association. The deputation pointed out that at the moment there were seven contractors' electrical showrooms in the town and not many of these were remunerative, but owing to the arrangements made with the Committee the members of the Association had fulfilled their promise that they would exhibit electrical apparatus to encourage inquiries and service from which the Department benefited in the sale of electricity. In the event of direct trading by the Department many of these showrooms would have to close and there would be a loss to the rates. It was pointed out that from 50 to 70 per cent. of the sales at the Department's showrooms were from inquiries sent by contractors and others, while at the present moment the contractors had to extend credit to customers, who in some cases took twelve to eighteen months to pay; the Electricity Committee's present system allowed only three months. At present the Electricity Department had a stock valued at £745, while the amount held by the contractors was approximately £6,000. If the present system was not acceptable, the deputation advised the closing of the showrooms except perhaps for demonstration. It approved a demonstration theatre. Monthly meetings could be arranged as adopted by other municipalities, and the saving to the Department would be considerable. The whole question could be reviewed each year. It was ultimately decided that consideration of the matter should be adjourned for the Eastbourne Branch of the E.C.A. to formulate and submit for consideration suggestions as to the future sale of fittings in time for a special meeting of the Committee, at which the deputation was again invited to be present.

Trade Commissioners' Visits

The Department of Overseas Trade announces that Mr. W. D. M. Clarke, H.M. Trade Commissioner at Bombay, is now in the United Kingdom on an official visit. Mr. Clarke will be at the Department of Overseas Trade on October 10th and 11th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Northern and Western India, after which he will undertake a short tour of some of the more important industrial centres in the provinces. Firms who desire an interview with Mr. Clarke in London or who wish to obtain information regarding his arrangements to visit the provinces should apply to the Department, 35, Old Queen Street, London, S.W.1, quoting reference 7933/1938.

Mr. J. W. Brigden, O.B.E., H.M. Trade Commissioner at Johannesburg, is also in the United Kingdom on an official visit. He will be at the Department of Overseas Trade in the week commencing October 3rd for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to the Union of South Africa, after which he will undertake a tour of some of the industrial centres in the provinces. Correspondence should be addressed to the Department quoting reference 7931/1938.

New B.I.F. Booklet

Figures showing the growth of the British Industries Fair since 1915, the year of the Fair's inception, are contained in an attractive booklet issued by the Department of Overseas Trade. In 1915, there was an attendance of 33,676; this year the attendance had grown to 380,031, while the number of exhibitors during the same period rose from 591 to 2,432, and the exhibition area grew from 88,714 sq. ft. to 856,396 sq. ft. The booklet points out that the Fair catalogue with its classified index in nine languages reaches prospective buyers in many countries weeks before the opening of the Fair and is used throughout the year as a standard reference book.

A Horticultural Demonstration at Manchester

Manchester Corporation Electricity Committee is holding a demonstration of the uses of electricity in the garden in the industrial demonstration room of the new electricity showrooms in the Town Hall extension. The exhibition opened on September 13th and continues until September 23rd. On September 14th, Mr. A. Monkhouse, gave a lecture in which the advantages of horticultural electrical equipments were emphasised. The appliances on view were mainly lent by the Electro-Horticultural Equipment Co., Ltd., Harpenden, Herts. The exhibition is the first of its kind to be held in Manchester. Nearly all the appliances in the demonstration room are wired up and ready for use. Assistants in the Electricity Department are in attendance to give advice with regard to installation costs, tariffs, &c. Plant on view includes greenhouse heaters, soil heating, plant irradiators, soil sterilisers, heated propagating frames, liquid culture, greenhouse fumigators, weed extractors and hedge clippers, and garden illumination.

An Appeal

Queen Mary College, still remembered by many no doubt as East London College, is known to electrical engineers for its well-equipped high-voltage engineering laboratory. This is one part of the modernisation and rebuilding of the College which is in hand and for which funds are required. As one means of raising money a Guild of Friends of Queen Mary College is being formed, and those who wish to encourage and support the excellent work which is being done by the College should get into touch with Mr. G. W. Keeling at the College, Mile End Road, E.1.

The New Stafford Showrooms

In our last issue we published a description of the new showrooms of the Stafford Corporation Electricity Department, and on Monday last these were formally inaugurated by Mr. A. N. East, of the Electricity Commission, who pressed a button, switching on all the lights in the building. The ceremony was followed by a luncheon at the Swan Hotel over which Councillor F. G. Amies, the Mayor, presided. In proposing the toast of the "Electricity Commission," Councillor S. Robinson (chairman of the Electricity Committee), said that they had received the consent of the Electricity Commissioners to a loan of £10,000 for apparatus in connection with the new simple hire scheme, and they proposed to present the first fifty consumers under this scheme with a free gift of either an electric iron or radiator. The aim of the Department was service and not profit, and they wanted to sell electricity to consumers as cheaply as possible. They realised the great advantage it would be if they could reduce the cost of electricity, and they felt that the best way would be to increase the number of kWh sold, and in that direction the domestic supply opened a wide field for expansion. The domestic load had been more or less neglected in the past, and it was felt that if they developed this side they could reduce the price of electricity. He mentioned that some architects and builders considered it a luxury to put in a power circuit, and advocated that local authorities should make houses all-electric when

Two electrical stands at last week's Bakers', Confectioners' and Allied Trades Exhibition at the Agricultural Hall showing (left) the G.E.C. display and (right) a Metrovick exhibit of electric vehicles

erecting housing estates. Mr. East, in responding, said that the showrooms had cost about £9,000 and that £200,000 was invested in the electricity undertaking, while their sales were about 20,000,000 kWh per annum. He condemned the antiquated idea that electricity would sell itself, and said that the only way to increase consumption was to show prospective consumers what they had to sell. He thought that any surplus on the electricity undertaking should go to the benefit of the consumers rather than to the ratepayers generally, many of whom, he pointed out, were possibly using gas. Councillor

A window display piece which forms part of the new Cryselco lamp publicity material

A. T. Jennings (vice-chairman of the Electricity Committee), in proposing the toast of "The Visitors," paid tribute to the assistance they had received from E.D.A., and in referring to the local branch of the E.A.W., said it was a good augury that there were so many ladies present. Councillor Mrs. Gregory (chairman of the E.A.W.), in reply, urged the need for educating women in the uses of electricity, and put in a plea for qualified women demonstrators, pointing out that it was necessary for a showroom to have a qualified demonstrator if it was to be a success. Mr. A. C. Cramb (Director, E.D.A.) said that E.D.A. could do much in helping to increase the domestic load, and mentioned that during the industrial depression the domestic load enabled the electricity undertakings to maintain an even keel. He considered that electricity was a greater boon to people with small incomes than to those who were better off. All the speakers paid tribute to the work of Mr. A. G. Kellie, the borough electrical engineer.

Belgian Electrical Imports and Exports

In the following table we give the value of Belgian electrical imports and exports for the six months ended with June last, as compared with the corresponding period of 1937. The sterling value of the totals has been converted at the rate of 143 fr. to the £.

	Imports. January—June		Exports. January—June	
	1937. 1,000 fr.	1938. 1,000 fr.	1937. 1,000 fr.	1938. 1,000 fr.
Generators, motors and rotary convertors	29,860	26,685	2,916	8,174
Static transformers	2,990	5,733	2,512	6,960
Mercury rectifiers	345	711	5	40
Other dynamo-electric machines	1,775	4,392	6,528	9,704
Dry batteries	1,215	1,189	91	97
Accumulators and parts	1,973	1,660	1,868	2,228
Magnets, other than electro-magnets	1,551	2,167	3	14
Land and submarine cables	611	957	32,483	53,765
Insulated wires and cables	10,689	8,301	27,630	33,889
Carbons and electrodes	5,058	4,500	101	59
Porcelain insulators	1,526	3,033	38	237
Elec. globes, bulbs and glassware	5,266	4,591	3,469	4,223
Insulating tubes, junction boxes, etc.	2,192	1,324	993	970
Other insulating material	1,936	2,279	232	139
Arc lamps	81	64	6	2
Incandescent lamps	9,203	9,363	8,627	8,539
Elec. measuring instruments	12,217	12,757	1,142	1,824
Telegraph and telephone apparatus	3,182	2,720	49,328	75,933
Radio receiving sets, complete	4,553	4,867	5,099	8,334
Radio receiving sets, partly assembled	904	362	10,544	4,782
Loud speakers, microphones, etc.	2,617	1,874	1,710	507
Radio valves	14,029	9,761	1,056	655
Other radio material	7,725	4,819	579	989
Other electrical apparatus	81,581	85,970	12,606	14,838
Total fr.	203,079	200,079	169,566	236,902
Total at 143½ fr. to £	£1,415,185	£1,394,279	£1,181,645	£1,650,885

The Birmingham Electric Club

The annual ladies' evening of the Birmingham Electric Club will be held on October 14th at the Grand Hotel, Birmingham. Tickets (12s. 6d. each) can be obtained from Mr. A. T. Haywood, hon. social secretary, 24, Tamworth Road, Sutton Coldfield.

Members desirous of competing in the snooker handicap should notify Mr. Haywood by October 1st (entrance fee 2s. 6d.).

State Aid for Hungarian Factories

The Hungarian Minister of Industry has informed the Budapest Chamber of Commerce that a subsidy of 50 pengös (£2) will be paid to small factories which desire to install a small electric motor in their plant, in accordance with recommendations recently made by the Chamber of Commerce in a memorandum to the Minister. Arrangements have been made whereby the larger electrical works will supply such motors on a hire-purchase agreement over a period of twenty-four months.

More Lamp Publicity

Further examples of lamp advertising and display material available to the trade have been received from The Cryselco, Ltd. The *pièce of résistance* is a complete large window display brightly coloured, showing a sunset at sea, a cut-out of a Cryselco lamp being suspended over the sun. At the foot of the display piece provision is made for the insertion of a lamp, while in the foreground the familiar figure of "Col. Chris Elco" points to the lamp. There is also a wall card with a similar scene, and another advertising the company's type "B" lamp. A cut-out of the coiled-coil lamp with the cap in black and gold has been prepared for hanging in the window. Other material available includes sets of beautiful waterways (cigarette cards), calendars, automobile lamp and price showcards and medium-sized cut-outs, a comprehensive catalogue, automobile and general price lists, which can be overprinted with the dealer's name and address.

New Australian Company

The Lincoln Electric Pty., Ltd., has been formed in Sydney, N.S.W., with a capital of £50,000, to undertake the production of electrical apparatus.

Furnace Installations

The Monometer Manufacturing Co., Ltd., has recently carried out further installations of the "Monometer" dual-valve cable furnace for the continuous feeding of lead extruding presses at the Eastleigh factory of the Pirelli-General Cable Works, Ltd. The company informs us that it is also supplying a similar type of furnace to Scottish Cables, Ltd., of Renfrew.

Electrical Conveyor for the "Queen Mary"

Herbert Morris, Ltd., have provided the *Queen Mary* with an electric baggage conveyor mounted on wheels, which is run out on to the quay and is then lifted by the quayside crane for connection to the ship. A man in charge of the conveyor presses a button and the baggage travels along the conveyor in a steady stream. Luggage handling is smooth and methodical, the main activities being concentrated on stowing or checking. The conveyor belt is electrically driven and can be controlled from either end.

The Herbert Morris baggage conveyor in operation

Protecting Cables from Fire

Details of tests carried out by large supply undertakings in the Midlands on a fire-resisting cable-covered material, have been sent us by Mr. H. C. Tofield, 39, Blakesley Road, Yardley, Birmingham. The material, termed "Noignite," is of smooth texture and its consistency can be varied from that of plaster to that of liquid paint. Other points claimed for it are that a ¼in. coating dries hard within twenty-four hours and when dry it does not affect lead or other materials, that it is vermin proof and impervious to oil and petrol and that it will withstand temperatures up to 2,000 degrees C. For the tests a fire of coal and coke was made in a brick enclosure, 5ft. by 3ft. by 18in. deep. A 2-in. dia. p.i.c. cable

was laid across and 2in. above the fire when the lead melted in 29 sec.; when lapped or canvas painted with the fluid composition, the lead melted in 3½ min. After covering with ¼ in. of the plaster, a 3-in. dia. cable was wrapped overall with canvas and laid within ½in. of the fire; after 20 min. the lead was only slightly discoloured. A cable of the same type and thickness but steel-tape-armoured was treated with ¼in. of the plaster and left for 29 min. on the fire without damage. In a final test a 2-in. dia. p.i.l.c. cable was treated with fire-proof paint lapped with asbestos webbing, 2in. wide and with an overlap of 1in. all round and then painted again and lapped as before; after remaining on the fire for 14 min. the lead melted. The plaster is said to adhere readily to steel framework as a protection against destruction by heat. Investigations are being made as to its suitability for insulating steam pipes.

For Sale

Goddard & Smith will sell by auction on September 29th at 70, Seymour Place, W.1, the stock of an electrical factor.

(See our Classified Advertisements.)

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:

C. Kenyon, Blackburn; N. Wm. Dixon, Stratford-on-Avon; A. E. Chapman & Co., Old Hill, Staffs; J. Richards & Co. (London), Ltd., 23, St. Mary Axe, London, E.C.3; H. W. Naylor, Preston; Tewkesbury Electric Light Co., Ltd., Mucklow Hill, Halesowen; Ledbury Electric Supply Co., Ltd., Mucklow Hill, Halesowen; Wessex Electricity Co., Newbury; Stroud Electric Supply Co., Ltd., Stroud; Esher & Claygate Electric Installations, Esher; W. Snelson, Salford, 5; Shropshire, Worcestershire & Staffordshire Electric Power Co., Mucklow Hill, Halesowen; Kidderminster & District Electric Supply Co., Ltd., Mucklow Hill, Halesowen; Butcher & Harrison, Withington, Manchester, 20; S. P. Garnett, Broughton, Preston; D. H. Little, Lochmaben; J. H. Graham & Son, Ltd., Hull; A. H. Clark, Hull.

At the same meeting one application was withdrawn and five were declined.

Instruments for Ironbridge Power Station

For the five boilers being installed at Ironbridge power station of the West Midlands J.E.A., the Cambridge Instrument Co., Ltd., is supplying five sets of electrical CO_2 recording and indicating outfits, and five sets of temperature indicating outfits. Each set comprises a single-point thread recorder, pattern "B," range 0-20 per cent. CO_2, measuring unit, comprising electrical CO_2 meter, bubbler aspirator and bracket. Cambridge moving scale indicator, range 0-20 per cent. CO_2, with coloured bands on scale showing green from 0-10 per cent., white from 11-15 per cent., and red from 16-20 per cent. The pattern "B" recorder and the moving scale indicator are flush mounted on the instrument panel. For each boiler there are four combined soot filters and intake pipes of a special design, these intake pipes being connected to a manifold which enables any one of the four sampling pipes to be connected to the CO_2 measuring unit. The temperature indicating outfits, of which there are also five sets, each comprise an 18-point temperature indicator, totally enclosed, arranged for flush mounting on the instrument panel and provided with two scales, namely, the upper scale, range 50-1,000 deg. F. for use with electrical resistance thermometers, and the lower scale, range 0-2,000 deg. F., for connection to thermocouples. There are fourteen electrical resistance thermometers installed at the various points for measuring superheater steam, economiser water inlet and outlet, economiser gas inlet and outlet, air heater gas inlet and outlet, and air heater air inlet and outlet temperatures, while two thermocouples are installed for measuring superheated gas temperatures, these thermocouples, as already indicated, being connected to the same instrument by means of the multi-way switch. The equipment also includes battery eliminators, enabling the outfits to be operated from the mains supply.

World Aluminium Statistics

Final figures of world production and consumption of aluminium in 1937, according to a review issued by the Aluminium Information Bureau, show that aluminium consumption has been in excess of production in each of the past two years, but while consumption has increased by 25½ per cent. production has increased by about 34 per cent. Production in 1937, according to figures issued by the Metallgesellschaft of Frankfort-on-Main, was 490,600 metric tons, equivalent to 482,900 long tons, and consumption was 501,700 metric tons, equivalent to 493,800 long tons. The principal producers of bauxite were France, Hungary, the U.S.A., Italy, British and Dutch Guiana, Yugoslavia and Russia. The Dutch East Indies and Greece have become relatively important producers of bauxite only in the past two years. The United States and Germany are by far the largest producers and consumers of aluminium, together accounting for 54 per cent. of world production in 1937.

WORLD ALUMINIUM PRODUCTION.

	1936.	1937.
	Metric tons.	
United States	102,000	132,800
Greater Germany	100,800	131,600
Russia	37,900	45,000
Canada	26,200	42,600
France	26,500	34,500
Switzerland	13,700	25,000
Norway	15,400	23,000
Italy	15,900	22,900
United Kingdom	16,400	19,400
Other countries	10,900	13,800
Total, metric tons ...	365,700	490,600
Equiv. long tons ...	359,900	482,900

In the United Kingdom production increased by 18.3 per cent. to 19,400 metric tons (equivalent to 19,100 long tons) against 16,400 metric tons in 1936, while consumption increased by 40 per cent. to a new record level of 49,000 metric tons (equivalent to 48,200 long tons). Aluminium consumption increased in every important country throughout the world, the only decrease recorded being in South and Central America which consume negligible proportions of the world's aluminium. The only country to show a decrease in production is Spain, where 700 metric tons were produced in 1936, but no output is recorded for 1937.

WORLD ALUMINIUM CONSUMPTION.

	1936.	1937.
	Metric tons.	
United States	127,000	154,000
Greater Germany	104,700	132,900
United Kingdom	34,000	49,000
Russia	38,000	47,000
France	27,000	28,000
Italy	17,000	26,000
Switzerland	9,000	13,000
Other countries	41,600	51,800
Total, metric tons ...	399,300	501,700
Equiv. long tons ...	393,000	493,800

E.A.W. Activities

The Summer School of the E.A.W. in electrical housecraft for science and domestic science teachers takes place from September 22nd to 27th at King's College of Household and Social Science, Campden Hill Road, W.8. Nearly 100 teachers will attend.

The E.A.W. is holding the golf finals for the Lady Hughman challenge bowl at Croham Hurst Golf Club on September 28th

Trade Announcement

E. K. Cole, Ltd., have now announced details of the range of washing machines to be marketed by the company under the trade name of "Ekco-Coffield." Five models will be available, and a distribution scheme has been prepared under which the company will sell only through the trade. Hire-purchase facilities will be available through a subsidiary company, Commercial Facilities, Ltd., and to help dealers further a special sales promotion organisation covering all aspects of sales and publicity has been inaugurated, and a range of sales aids, window bills and leaflets is available. Supplies will be available from the usual wholesale houses or direct from the "Ekco" factory at Southend-on-Sea. Servicing and rebuilding under a twelve-year guarantee will also be undertaken by the existing Ekco Service Centre at Southend-on-Sea and the company's provincial depôts.

Change of Address

The Incorporated Municipal Electrical Association has removed to Bush House, London, W.C.2 (telephone: Temple Bar 1882. Telegrams: Munielect, Bush, London).

"Neophan" Glassware

Referring to Mr. Harold Bright's article on "Lamps and Lanterns" in our issue of September 2nd, Crompton Parkinson, Ltd., state that the author was not strictly correct in stating that their "Neophan" glass cannot be blown, and that fittings made from it have to be moulded. They say that this glass is invariably blown for all standard types of opalescent glassware; moulding is only carried out for special shapes which cannot be dealt with by the blowing process.

Australian Electrical News

Our Australian correspondent reports that sales of radio sets in Australia have been heavy during the past few months, mainly owing to the keen interest in the cricket test matches. Heaters of all types have been selling well, and there has been a great increase in the advertising of vacuum cleaners. One or two leading firms started to give a good deal of space to these lines, and others quickly followed suit. Small air-conditioning plants are likely to be on the market in the near future. The demand for these, if they are reasonably priced, is likely to be considerable in several States where summer conditions can at times be more than trying.

The Queensland Government will shortly enforce a regulation prohibiting the sale, display, or advertising for sale of electrical fittings which do not conform to the requirements of the Standards Association of Australia.

Craftsmanship and Draughtsmanship

The Physical Society announces that the tenth annual craftsmanship and draughtsmanship competition will be held, as usual, in conjunction with its annual exhibition of scientific instruments and apparatus in January next. Competitors must be in the regular employ of a firm or institution which will be exhibiting, or has exhibited at least once during the previous three years, and which has been invited by the organising committee to enter its employés for the competition.

Electric Smelting of Nickel Ore

An electric smelting works is to be established at the nickel ore mines at Petsamo, North Finland, for treating the nickel ore which contains about 1.6 per cent. of nickel and 1.3 per cent. of copper. The company concerned is the Petsamon Nikkeli Oy, in which the Mond Nickel Trust is financially

interested. Power will be supplied from the generating station which is being erected at the Janiskoski falls of the river Pasvik, where about 37,000 h.p. is to be developed.

The Southend Illuminations

Southend-on-Sea Corporation has again arranged an elaborate scheme of illuminations. The popular "Never Never Land" opened on July 30th, while the general illuminations of the sea front commence to-day (Friday). In connection with these illuminations the Department has prepared a souvenir brochure illustrating in colour some of the set pieces of "Never Never Land."

Prices of Materials

Henry Gardner & Co., Ltd., report, September 14th: Copper bars (best selected), sheet and rod, no change. English pig lead, £17 5s., £1 increase. Spelter, £14, 17s. 6d. increase. English block tin, £194, £1 5s. increase. Mercury, no change.

Frederick Smith & Co. report, September 14th: Electrolytic copper bars, £47 15s., £1 15s. increase. Ditto, ditto, wire rods, £52 10s., £1 15s. increase. Ditto, ditto, h.c. wire, 7⅜d., 3/16d. increase. Silicium bronze wire, 9d., 1/16d. increase.

Edward Till & Co. report, September 14th: India rubber, Para fine, no change.

New Catalogues and Lists

Jackson Electric Stove Co., Ltd., 143, Sloane Street, London, S.W.1.—A coloured catalogue of new season's electric fires.

Renold & Coventry Chain Co., Ltd., Didsbury, Manchester.—A brochure dealing with the application of chain drives in paper mills, a 120-page book on stock chain drives, and a 100-page catalogue of chains and accessories.

Electrical Commodities, Ltd., Sparton Works, Beresford Avenue, Wembley.—A catalogue illustrating the 1938/39 range of electric clocks is now available.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—A folder dealing with problems in centralised control of two-speed motors for boiler-house fans.

Falk, Stadelmann & Co., Ltd., 83/93, Farringdon Road, London, E.C.1.—A leaflet dealing with "Sun-Star" reflectors and floodlights.

Rheostatic Co., Ltd., Slough.—Details of "Satchwell" motorised butterfly valves.

Hackbridge Electric Construction Co., Ltd., Walton-on-Thames.—A catalogue of on-load tap-changing equipment and small air-cooled transformers.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, London, E.C.4.—A booklet dealing with exhaust ventilation and cooling.

Benjamin Electric, Ltd., Tariff Road, Tottenham, London, N.17.—"A Benjamin Recipe Book" is the title of an illustrated art book dealing with lighting for such purposes as bathing pools, foundries, laundries, stores, &c.

O. E. W. Neville, North Wharf, Gordon Road, West Ealing.—Details of the "Pulleygrip" to prevent belt slip.

Mather & Platt, Ltd., Park Works, Manchester.—A catalogue relating to the "Thermolier" unit fan heater.

James Douglas, 5, Crest Road, South Croydon.—A catalogue of "Monarch" electric fires.

Bristol Instrument Co., Ltd., Brent Crescent, West Twyford, London, N.W.10.—A leaflet (No. 442) giving details of temperature recording instruments suitable for factories to ensure compliance with the new Act.

Milliwatt Heating Pad, Ltd., 32/36, Fleet Lane, Old Bailey, London, E.C.4.—A catalogue of electric heating pads and blankets.

British Insulated Cables, Ltd., Prescot.—Leaflets dealing with rising main junction boxes, and disconnecting network boxes.

Philips Lamps, Ltd., 145, Charing Cross Road, London, W.C.2.—A 64-page catalogue of electric lamps and a catalogue of electric lighting fittings.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—An illustrated folder depicting new lighting fittings.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—Catalogues of artistic commercial fittings, shades and floodlights, and also of electric clocks.

Private Arrangements

W. G. Robertson, trading as W. Robertson & Co., 2-4, George Street, Paisley, wireless dealer, &c.—The creditors were called together recently, when Mr. R. T. Dunlop, 45, Renfield Street, Glasgow, submitted a statement of affairs showing liabilities of £1,031. The net assets were £538, leaving a deficiency of £493. In the absence of any offer it was decided that the estate should be realised under a trust deed in favour of Mr. R. T. Dunlop. A committee of three of the principal creditors was also appointed.

H. Millwood, late of 599, Hertford Road, Enfield Wash, Middx., wireless dealer.—The creditors were called together recently. No detailed statement of affairs was submitted, but it was estimated that the amount due to trade and sundry creditors amounted to £798. In addition, debtor's mother was a creditor for £400, in respect of cash advanced, but it was stated that she was prepared to withdraw her claim if the matter were dealt with privately. The total assets were £162. A resolution was passed in favour of the estate being administered under a deed of assignment with Mr. L. A. Reddall, 1, Guildhall Chambers, Basinghall Street, E.C., as trustee.

G. E. Frewer, radio and electrical engineer, 16, Malden Road, New Malden.—At the meeting of the creditors the statement of affairs disclosed liabilities of £732. The net assets were £307, leaving a deficiency of £424. It was decided that a deed of assignment should be executed to Mr. F. E. Bendall, of Bendall, Poppleton & Appleby, 4, Charterhouse Square, London, E.C., with a committee.

F. W. Ames, electrical engineer, 20, Longford Road, Bognor Regis.—At a meeting of creditors the statement of affairs showed liabilities of £397. The assets totalled £1,046, leaving a surplus of £650. It was suggested that a moratorium should be granted for one month in order to enable the debtor to submit an offer. A resolution was passed in favour of a deed of assignment being executed to Mr. F. E. Bendall, of Bendall, Poppleton & Appleby, 4, Charterhouse Square, London, E.C., with a committee of three of the creditors.

I. H. P. Watson, trading as Watson Bros., wholesale wireless and electrical factors, 40, Dock Street, Newport, Mon.—The creditors met recently at Newport, when the statement of affairs showed ranking liabilities of £3,256. The net assets were £1,120, leaving a deficiency of £2,135. In addition to the liabilities shown in the statement there was a contingent liability in respect of hire purchase finance. It was pointed out that the business made good progress up to about 1935, when the radio manufacturers more or less abandoned the policy of dealing through factors. In an endeavour to increase the turnover the debtor commenced dealing in washing machines, but that venture was not successful. There was a possibility of an offer of 7s. 6d. in the £ being put forward. A resolution was passed confirming the deed of assignment already executed to Mr. F. J. Notley, of Friary Chambers, Dock Street, Newport, subject to Mr. L. S. Findlay, of Poppleton & Appleby, 35, Windsor Place, Cardiff, being appointed as joint trustee. A committee was also appointed, and the trustees and committee were authorised to accept an offer on behalf of the general body of creditors.

Company Liquidations

W. W. Tilley, Ltd., wholesale electrical dealers, Handyside Arcade, Newcastle-on-Tyne.—The statutory meeting of the creditors was held recently at Newcastle-upon-Tyne, when Mr. G. W. Tilley, a director of the company, occupied the chair. The statement of affairs disclosed liabilities of £1,353. The net assets were £1,011, leaving a deficiency, so far as the creditors were concerned, of £343. The issued capital of the company was £964, and as regarded the shareholders there was a deficiency of £1,307. A resolution was passed confirming the voluntary liquidation of the company with Mr. F. E. Proom, Newcastle-on-Tyne, as liquidator. A committee of inspection was also appointed.

Northern Electrical Distributors, Ltd.—Winding up voluntarily. Liquidator, Mr. H. Astles, 56, Mosley Street, Manchester.

Bankruptcy Proceedings

J. J. Eastick & Sons (a firm), carrying on business at Eelex House, 118, Bunhill Row, E.C., wireless factors.—The adjourned first meeting of creditors was held on September 7th at London Bankruptcy Buildings. Mr. West, Senior Official Receiver, reported that the debtors had intimated that they would be prepared to pay a composition of 5s. 6d. in the £, 5s. to be paid at once and 6d. later. If the creditors were not prepared to accept the composition the estate would have to be wound up in bankruptcy, and the dividend would depend on the favourable realisation of the estate. The statement of affairs showed liabilities of £72,229, of which £62,526 was expected to rank for dividend, against assets of £18,643. The proposition was put to the vote and was agreed to.

E. W. Pearson, 59, Bedford Road, Southport, electrician.—At the first meeting of creditors held on September 2nd at the offices of the Official Receiver, Government Buildings, Victoria Street, Liverpool, the case, being a summary one, was left with the Official Receiver as trustee.

E. F. Hunt, radio and electrical dealer, "St. Albans," Cherry Chase, Tiptree, Essex, lately trading with another as Hunt's Radio Service, Cameron House, High Street, Ingatestone, Essex.—Application for discharge to be heard on October 10th at the Shire Hall, Chelmsford.

A. Hitner, electrical engineer and radio dealer, 7, Linden Grove, Fallowfield, Manchester.—Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2, released August 26th.

C. J. C. Etchells, electrical and radio dealer, 8, Jedburgh Street, Middlesbrough.—Last day for receiving proofs for dividend, September 28th. Trustee, Mr. C. L. Townsend, 80, High Street, Stockton-on-Tees, Official Receiver.

H. L. A. Wines, radio engineer, King Street, Yeovil.—First and final dividend of 7⅞d. in the £, payable September 14th, at 12, Rolleston Street, Salisbury.

H. White, radio and electrical engineer, Ridgeway Lane, Ambergate, and lately carrying on business at 38, Nottingham Road, Ripley, both in Derbyshire.—Public examination October 18th at the Court House, 20, St. Peter's Churchyard, Derby.

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 7th:—

Shav-O-Matic. No. 586668. Class 6. Electrically operated shaving machines.—Julius Toubkin, 17, Todd Street, Manchester.

Simmerstat, No. 586871, and Simstat, No. 586873. All goods in Class 8.—Sun-Vic Controls, Ltd., 1, Kingsway, W.C.2.

Fada Radio (lettering and design). No. 578304. Class 8. Radio detectors and parts, radio crystals, amplifiers and parts, rheostats, and switches, all for use in connection with wireless telephony and television; radio receiving sets and television receiving sets.—Jacob Martin Marks, trading as the Fada Radio and Electric Co., Long Island City, N.Y., U.S.A. (British representatives, Eric Potter and Clarkson, 4-5, Staple Inn, High Holborn, W.C.1.)

Pyrotenax (lettering and design). No. 585315. All goods in Class 13.—Pyrotenax, Ltd., 74, Victoria Street, Westminster, S.W.1.

Aceweld. No. 584118. Class 18. Electric and oxy-acetylene welding plant.—The General Marketing Corporation, Ltd., 619, Grand Buildings, Trafalgar Square, W.C.2.

Start-o-Matic (lettering and design). No. 586983. Class 18. Electric lighting plant.—R. A. Lister & Co., Ltd., Victoria Ironworks, Dursley, Gloucester.

Electricity Supply

Lighting, Domestic, Power

Accrington.—RENT TO INCLUDE ELECTRICITY CHARGES.—The Corporation is putting into operation a scheme whereby payments for electricity used will be collected weekly with rentals on the municipal housing estates, thus making one charge for rent, water and electricity.

REDUCED CONSUMPTION. — A warning that electricity charges may have to be altered was given by Sir Thomas Higham, chairman of the Electricity Committee, at the September Council meeting. He revealed that in June and July electricity consumption dropped considerably. Asked to account for the decline, Sir Thomas said the chief reason seemed to be that trade was worse than a year ago.

Barlaston.—ELECTRIC POTTERY KILNS.—Electric kilns will be employed exclusively at a new pottery which is now being built for Josiah Wedgwood & Sons, Ltd. For firing both biscuit and glost an electric tunnel kiln will be used, a supply of electricity being provided for the purpose by the Stoke-on-Trent Corporation, which has applied for a Fringe Order. Electricity for an enamelling kiln and also for lighting and power will be generated at the factory's own power station, which will be equipped with special flue-gas washing plant for eliminating fumes and grit.

Barnsley.—ELECTRIC WASHBOILERS.—The Sanitary Committee has asked the borough electrical engineer to quote for the installation of electric wash boilers in flats on the Mount Vernon estate.

Blackpool.—INAUGURATION OF ILLUMINATIONS.—The Mayoress of Blackpool (Councillor Mabel Quayle) has agreed to open the Blackpool illuminations' season to-day (Friday).

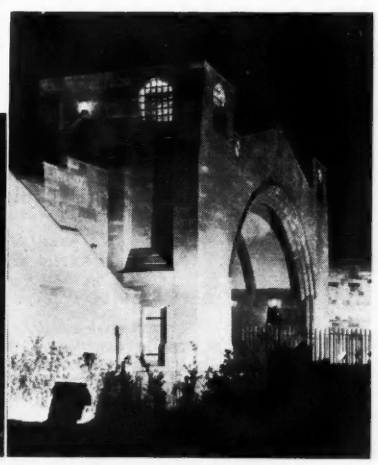
Bradford.—EXTENSION TO OUTLYING AREA.—In Egypt, a remote part of the supply area, a change-over from oil lamps to electricity will soon be effected. The Electricity Committee has approved an extension of the supply to a girls' hostel, seventeen farms, twelve cottages, a farm building and an hotel in this district, at an estimated cost of £2,397.

SUB-STATION.—The Electricity Committee is to erect a sub-station in Station Road, Manningham.

Bridgend.—ATTEMPT TO SETTLE DISPUTE.—An attempt to settle the long-standing dispute between the Bridgend and Penybont Councils regarding the Kenfig Hill bulk supply was made at a meeting of the former Council when a deputation from Penybont attended. It was decided that each Council should submit its case to the Electricity Commissioners for a determination, each reserving the right of appeal.

Cardiff.—OVERHEAD LINES.—The Electricity Committee has agreed to proposals of the South Wales Electric Power Co. to erect overhead transmission lines in Ball Road and Greenway Road, Rumney.

Chester.—EXTENDED ILLUMINATIONS.—The autumn floodlighting display of historical attractions and illumination of the River Dee was opened by the Mayor of Chester, Alderman George Barlow, from the New Gate, on September 10th, and will continue until October 9th. This is the fourth year of the Chester illuminations, which combine the artistic floodlighting of famous historical buildings and features such as the city walls, towers, and gateways, the church towers and spires, the castle, the cathedral, the militia buildings, and the bridges, with the more popular illumination of the River Dee and its motor launches and other craft. Among the new features of the present display are the extension of the cathedral floodlighting to cover the whole of the south-western side and the central tower; the extension of the river festoons up to the Fords; the illumination of the New Gate just built in the city walls; and the erection of an illuminated ship on the river. This ship is 140 ft. long and has masts 65 ft. in height. A new water fountain, erected near the Dee Bridge, pumps 14,000 gallons of water per hour into the sprays which are illuminated by coloured lights. Altogether 15 miles of cable and 12,000 lamps have gone to the making of the 1938 display, which has a total loading of 400 kW. The three previous years of the illuminations have been responsible for attracting one and a half million visitors to the city.



The Cathedral and New Gate at Chester floodlighted for the Autumn Illuminations

Derby.—DEVELOPMENT.—During the past year the undertaking has continued its commercial development in a definitely satisfactory manner and the results indicate appreciation by the public of the attractive tariffs and other facilities offered, states the borough electrical engineer, Mr. F. Nicholls. The advance of electric cooking has continued, no fewer than 4,383 cookers having been added during the year, making the total number installed at the end of March last 16,650. Water heating continued to advance very satisfactorily and the records show that 1,596 heaters were installed during the year, making a total number in commission of 4,256. The immersion circulator fitted into existing bathroom cylinders has proved an extremely convenient piece of apparatus and the demand for this increased by 846 during the year. The wash boiler hiring scheme provides another example of the response to attractive facilities; 1,653 were installed on hire during the year, whilst 712 were sold. There were altogether 5,737 of these boilers in use at the end of March. The number of consumers increased during the year by 3,617 and the total number is now 50,549. The number of premises in the area of supply is approximately 56,115, and those supplied with electricity amount to 90 per cent. of the total. The total lighting, heating, cooking, power and traction apparatus connected to the system stands at the equivalent of 241,380 kW, 46,529 kW having been added during the year, representing an increase of 23.9 per cent. Sales of electricity amounted to 86.1 million kWh, an improvement of 10 per cent.

Doncaster.—SUPPLY EXTENSION.—The sum of £3,010 is to be expended on mains, sub-station building and equipment in connection with the provision of an electricity supply to the Toll Bar, Bentley, district. Application is being made to the Electricity Commissioners for sanction to the cost of the works being met out of the reserve fund.

Dover.—SPECIAL TARIFF.—Following an application from several potential large consumers, a special tariff at lower rates has been approved by the Electricity Committee.

Dundee.—CAROLINA PORT EXTENSIONS.—A tender amounting to £32,152 for extensions at Carolina Port generating station will be submitted to Dundee Town Council. The original tender of the British Thomson Houston Co. for 33-kV switchgear was £64,138. Certain items have now been omitted and the Corporation is recommended to adopt the revised scheme.

Eastbourne.—SUB-STATION.—The Electricity Committee is to erect and equip a sub-station in Hyde Gardens at a cost of £3,040.

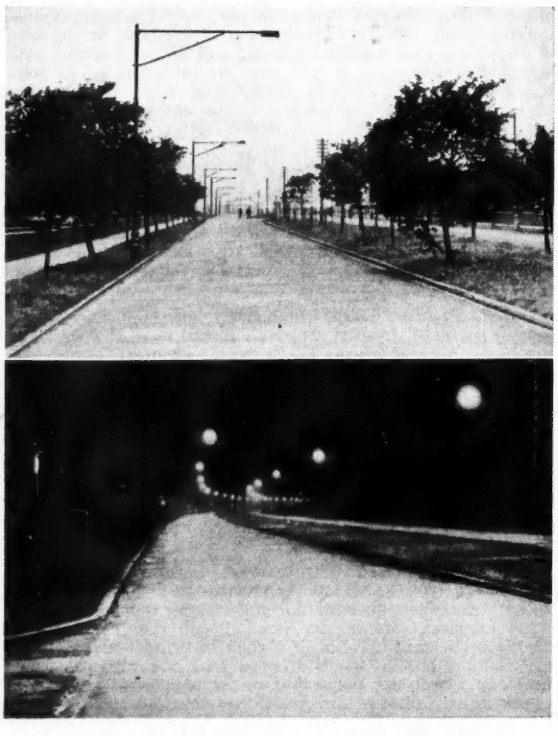
Grimsby.—AIR RAID PRECAUTIONS.—Speaking at a recent meeting of the Electricity Committee upon the question of A.R.P. in connection with the undertaking the borough electrical engineer (Mr. S. R. Windle) said that even if they enclosed the entire works in a shell of concrete 15 to 18 in. thick and a 500 lb. bomb dropped near the works it would probably wreck any plant that might happen to be running at the time. It was now clear that the undertaking would have to bear the full cost of training the staff, preparing the scheme, providing an emergency station, fire fighting and warning measures, and staff shelters. Mr. Windle's idea of precaution lay rather in the matter of finding a second point of supply, so that the grid could be switched in in a few minutes, and so furnishing a supply quickly if the generating plant were wrecked.

EXTENSION PLANS.—The Corporation Electricity Department, which supplies 325 square miles of Lincolnshire, including points over twenty miles from Grimsby, is undertaking extensions at the generating works costing £140,499 and plans £23,540 extensions to distribution services. At the present time the generating capacity is 25,500 kW, and a further 15,000 kW is now being installed. In the last twelve months 280 miles of distributing cable were laid, the kWh sold numbered 52,032,740 (against 48,137,450 in 1936-37), and the number of consumers was 24,580 (against 23,146). At a recent meeting of the Electricity Committee the borough electrical engineer reported that the supply was being extended to Saltfleet at a cost of £4,240. It is proposed shortly to extend the mains to Saltfleet by (£7,850); Tathwell, Stenigot and Donnington-on-Bain (£11,450).

Hetton (Co. Durham).—LIGHTING AGREEMENT CHANGED.—On the grounds that the charge for electricity is too high the South Hetton Parish Council has decided not to renew its electric street lighting contract with the South Hetton Coal Co. It has been decided to ask the North-Eastern Electric

Supply Co., Ltd., to take over the network and supply the electricity.

Jarrow.—DUAL-CARRIAGEWAY LIGHTING.—As reported in our last issue, the Mayor (Alderman T. O'Connor) recently switched on a new sodium lighting system in York Avenue, a thoroughfare opened in July, 1928, by H.M. King George VI, then Duke of York. It is a modern highway, 1,300 yds. in length, with dual carriageways, each 24 ft. wide, separated by a 22-ft. grass verge and flanked at each side by footpaths



Day and night photographs of the new road lighting installation at Jarrow

with a grass verge 15 ft. wide. The new installation consists of thirty-nine Philips "Philora" 150-W sodium lamps in Revo C9325 silvered reflectors mounted on Revo 25-ft. steel columns with 13-ft. overhanging brackets. The spacing is 180 ft. on each road, the columns being staggered to give the effect of 90-ft. spacing, and the illumination is B.S.S. Class "D." The whole of the work was completed in the remarkably short time of twenty working days by the installation contractors, Callender's Cable & Construction Co., Ltd.

Ladybank (Fife).—STREET LIGHTING.—The Town Council is to investigate the possibility of lighting the streets by electricity instead of by gas as at present.

Minster.—ALTERNATIVE SUPPLY.—The Minster Council has received a letter from the South-East Kent Electric Power Co. giving notice of its intention to use a supplementary system of supply in case of emergency. A new high-voltage feeder is to be placed at Sturry to supplement the power line from Sandwich.

Northampton.—OVERHEAD EXTENSIONS.—The Northampton Electric Light & Power Co., Ltd., is to erect overhead high-voltage lines at Milton and Rothersthorpe, and low-voltage lines at Rothersthorpe and Kislingbury.

Norton.—RURAL SUPPLIES.—At a recent meeting of the Rural District Council a lengthy discussion took place with regard to the need for electricity supplies being made available to various parishes, particularly Langton and Westow. It was decided to make representations to the North-Eastern Electric Supply Co., Ltd., in the matter.

OVERHEAD EXTENSIONS.—The R.D.C. has approved a scheme of the Buckrose Light & Power Co., Ltd., for additional overhead lines at Willerby.

Otley.—ELECTRICITY FOR COUNCIL HOUSES.—The Housing Committee is seeking sanction to borrow £950 for the supply of electricity to 205 houses on the Newall estate.

Peterborough.—ELECTRICITY FROM SLUDGE GAS.—No objection has been raised by the Electricity Commissioners to the proposal of the City Council to install plant at the sewage works for the generation of electricity from sludge gas. Technical details are to be furnished to the Commissioners.

Plymouth.—ELECTRIC CRANES.—At the Plymouth Docks three hydraulic cranes are to be replaced by electrically operated equipment, while three new electric cranes are to be added at the Glasgow Wharf. As part of the scheme the existing hydraulic supply station will be discontinued and two electric capstans are to be provided.

St. Albans.—FROM GAS TO ELECTRICITY.—The Finance Committee of the Rural District Council has decided to change the street lighting at Sandridge, London Colney and Hill End from gas to electricity. It has accepted a tender by the "Northmet" Co.

RURAL SUPPLIES.—Permission has been granted to the "Northmet" Co. to erect an overhead line to serve Hammond's Farm and district, Sandridge, Herts, with the reservation that the Rural District Council shall have power to reconsider the matter after five years.

Sedgefield.—STREET LIGHTING.—Arrangements have been made with the North-Eastern Electric Supply Co., Ltd., for street lighting at Ferryhill station and Chilton Lane. Work is to be started forthwith.

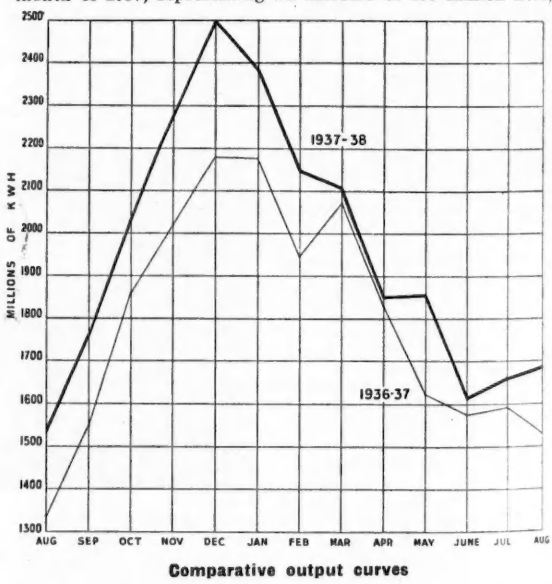
Sunderland.—AUTUMN ILLUMINATIONS.—The annual illuminations arranged by the Town Council at Roker were switched on last Saturday. This year £30,000 has been expended—£10,000 more than last year. There are 65,000 lamps and over 600 floodlights. All the seafront from Roker to Seaburn has been floodlighted and over fifteen miles of wiring has been used. While some of last year's features are retained, many new ideas have been incorporated, including the erection of a Lilliputian Village in the Merry Dell, and a jungle school with an animals' jazz band. There is a Chinese garden with 750 lanterns, a pirates' cave, floodlighted waterfall and illuminated park lake.

Thingoe.—COUNCIL HOUSE INSTALLATIONS.—The East Anglian Electric Supply Co. recently wrote to the Rural District Council stating that it was prepared to introduce a further concession for houses owned by local authorities by offering a free wiring installation, consisting of three lighting points and a plug point, complete with lamps and shades. It was resolved to inform the company that the Council was prepared to insert a clause in future tenancy agreements providing for the payment to the company by the tenant of the minimum charge for electricity if the houses were wired throughout free of charge to the Council.

UNDERGROUND CABLES STIPULATED.—At the same meeting an application from the company for permission to carry out various extensions, including the distribution in Barrow, was considered and it was resolved to consent only on condition that underground cables were used in the villages themselves. Col. C. D. Harmer, who moved the resolution, observed that poles carrying distribution lines had made a "ghastly mess" of Tuddenham, formerly a very pretty village.

Generation of Electricity in August

OFFICIAL returns rendered to the Electricity Commissioners show that 1,679 million kWh was generated by authorised undertakings in Great Britain during August as compared with the revised figure of 1,529 million kWh in the corresponding month of 1937, representing an increase of 150 million kWh,



Comparative output curves

or 9.8 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was twenty-six as against twenty-five last year.

During the eight months of 1938 up to the end of August the total amount of electricity generated by authorised undertakings was 15,288 million kWh, as compared with the revised figure of 14,340 million kWh for the corresponding period of 1937, representing an increase of 948 million kWh, or 6.6 per cent.

Walsall.—EXTENSION.—A supply is to be given at a cost of £1,030 to an estate being developed at Aldridge by Mr. L. Dickinson.

DECENTRALISATION OF SUPPLY.—The Electricity Committee is to decentralise the electricity system by obtaining a duplicate point of supply from the West Midlands J.E.A. at a cost of £39,300. The old generating station building at Wolverhampton Street is to be converted into a 33,000-V switch house, with provision for use at a later date if required as a major transforming point, and a new 33,000/6,600-V sub-station is to be erected in Darwall Street adjacent to the existing sub-station, where the alternative supply will be transformed to 6,600 V and fed into the existing mains.

Willingdon (Sussex).—STREET LIGHTING.—A public inquiry regarding a street lighting scheme is being held to-day (Friday).

York.—POWER STATION EXTENSIONS.—The Electricity Committee, at the request of the Central Electricity Board, is to extend the power station, including the installation of a turbo-alternator and the erection of cooling towers, &c., at a cost of £199,850.

LOAN.—The Electricity Committee is seeking sanction to borrow £30,000 for consumers' apparatus.

Overseas

China.—INCREASE IN CHARGES.—The municipal authorities in the Shanghai International Settlement have authorised the Shanghai Power Co. to increase the price of energy by 24.45 per cent., owing to low exchange rates and the high cost of coal.

Morocco.—ELECTRICITY PRODUCTION IMPROVEMENT.—Figures for electricity production in Morocco for the first six months of this year show a total output of 69 million kWh. This is 9 million kWh more than during the same period last year.

New Zealand.—LIGHTING A TRAFFIC TUNNEL.—A modern system of lighting has been installed in the Mount Victoria traffic tunnel, in the City of Wellington, which forms the main outlet from the city proper to the suburbs of Hataitai, Kilbirnie, Lyall Bay, Miramar and Seatoun. The tunnel is 2,045 ft. long, 28 ft. wide, and 22 ft. from pavement to the top of the arch. The approach from both ends is through a clay cutting, with bright clay sides, so that a very high intensity of illumination is experienced immediately before entry, and when the sun is shining the hill casts a very hard shadow just outside the

The Mount Victoria, N.Z., traffic tunnel, showing the new lighting

portals. A clearance of no more than 17 ft. 6 in. could be secured between the light source and the roadway. The problem of mounting height meant that unless a very large number of fittings was to be used, the cut-off provided by the usual fitting would give a banded effect on the roadway. This point was bound up with that of cost, and as the amount of money available was limited it became necessary to adopt a fitting which could throw the light up and down the roadway, seemingly into the motorist's face, and still leave him free from any suggestion of glare. The type C9325 silvered mirror reflector fittings made by the Revo Electric Co., Ltd., and supplied by Gough, Gough & Hamer, of Christchurch, were used in this scheme, with 150-W Philips "Philora" sodium lamps. The design and the work were carried out by the staff of the Electricity Department of the Wellington City Council. —*New Zealand Electrical Journal.*

Palestine.—MORE ELECTRICITY USED.—Sales of electricity continue to increase despite the intensification of terrorism. During the first half of this year, according to recently published figures, the Palestine Electric Corporation, Ltd., sold 500,000 kWh more than in the corresponding period of last year, and 3,000,000 kWh more than in the first half of 1936. Of the 31,014,000 kWh sold 13,634,000 kWh was for power, a rise of 1,285,000 kWh over the first half of 1937. Lighting consumption has decreased, due no doubt to successive local curfews and the general disturbed state of retail trade.

Communications

Angola.—TELEGRAPH AND TELEPHONE IMPROVEMENTS.—The long expected programme of public works for the colony of Angola is published in a decree of the Portuguese Government. Among the works to be undertaken is the erection and improvement of the telephone and telegraph services and the wireless connections within the colony. The programme will be financed by the floating of a special "Angola Extension Fund" of at least 135,000,000 escudos.

Finland.—NEW TELEPHONE CABLE.—The Finnish Post Office is to construct a new telephone cable between Helsinki and Abo, and at the latter point it will connect with the new submarine cable to Sweden. The Helsinki-Abo cable is estimated to cost 34 million Fmk., of which 21 million Fmk. has been granted for construction of the first section, Helsinki-Nummenkyla, during the current fiscal year.

France.—ANTI-INTERFERENCE MEASURES.—The Ministry of Posts and Telegraphs has promulgated a decree providing for the creation of a commission to examine electrical appliances from the standpoint of radio interference. The commission is empowered to require manufacturers to make such modifications as may be necessary.

THE RADIO INDUSTRY.—There are twenty-six French broadcasting stations, of which eleven are private, thirteen are medium-wave stations belonging to the State, and the others are the long-wave station (Radio-Paris) and the short-wave station (Radio-Mondial), also belonging to the State. The capital invested in the industry is estimated at 2,500 million fr., and the number of people employed in the manufacturing side is estimated at 25,000. There are over 4,500,000 licence holders, and about 800,000 sets are bought by the public each year.—*World Radio.*

Great Britain.—AUTOMATIC TELEPHONY.—The Post Office has plans in hand for building an automatic exchange to replace the present manual exchange at Whitley Bay. Recently a new automatic telephone exchange was opened at Filey (Yorks).

IMPROVING SCOTTISH TELEPHONE SERVICES.—Speaking at a luncheon given in his honour by the Lord Provost of Perth on Monday, the Postmaster-General (Major G. C. Tryon) stated that the sum of £2,500,000 would be spent this year on the development of communications in Scotland. Most of the money, he said, would be devoted to conversion of telephone systems from manual to automatic. This would include the conversion of 90,000 telephones and the erection of twenty-six new buildings in Glasgow alone. The Post Office had also secured a site for a submarine cable base at Dalmuir, and a cable ship would be permanently based there.

India.—DEBATE ON BROADCASTING.—There was recently a vigorous debate in the Indian Legislative Assembly on the subject of broadcasting. A resolution was moved by a member of the Congress party that a committee should be appointed to inquire into the broadcasting administration, to arrange for cheap radio sets, and to make programmes popular. One member asked why Mr. Kirke's report was not published, while another member suggested that Indians should be sent abroad for training rather than foreign experts being employed. It was generally admitted that the price of sets was extremely high, and one member pointed out that apparatus which cost at Bombay, ex duty, only Rs. 58, was listed in Delhi at Rs. 300. Mr. Clow, on behalf of the Government, thought that an inquiry was not necessary at the present stage, and the House rejected the proposal to appoint a committee.

Iran.—TEACHING RADIO TELEGRAPHY.—A school for radio telegraphy has been founded at Teheran by the Ministry for Posts and Telegraphs to train staff for radio stations to be set up in all the principal towns. The course of instruction will last two years, during which each student will be granted an allowance of 300 Rials (£3 15s.) per month. A condition is that entrants must agree to serve the Ministry for five years after passing the examination.—*Reuter.*

Latvia.—GROWING TELEPHONE DENSITY.—A census of telephone subscribers taken on August 1st showed that the number of installations totalled 72,400 in a population of approximately two millions. By the same date the Latvian Post Office had received over 2,000 applications from new subscribers, of which 75 per cent. were among the rural population. The popularity of telephones in farming districts is unusually great.

Rumania. — TELEPHONE EXPANSION PROGRAMME. — The Rumanian Telephone Co., an American-controlled concern, is to raise its capital from 1,000 million to 1,500 million lei. The company is undertaking considerable extensions, including a new long-distance cable from Bucharest to Kronstadt, automatic exchanges in a number of provincial towns, &c., and new capital is necessary to finance these.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Agent for Ohio Elec. Mfg. Co., Cleveland, U.S.A.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Accrington.—September 23rd. Electrical installation at High School. S. Wilkinson, county architect, County Offices, Preston (deposit £2).

Australia.—MELBOURNE.—October 4th. Posts and Telegraphs Department. Four ringing motor-generator units and ringing convertors. (T. 26139/38.)*

October 4th. Underground cable. (T. 26684/30.)* Relays for operation on a 24-V d.c. circuit. (T. 26685/38.)*

VICTORIA.—October 4th. State Electricity Commission. 132,000-V outdoor switchgear and accessories. (T.Y. 26120/38.)*

October 18th. Steel cored aluminium conductors and sleeves for twelve months. (T.Y. 26700/38.)*

October 11th. 66-kV switchgear and accessories. (T.Y. 26120/38.)*

October 18th. 6.6-kV metal-clad switchgear and accessories. (T.Y. 26243/38.)*

Birmingham.—September 30th. Electric Supply Department. Three-phase transformers up to 1,000-kVA capacity. (September 2nd.)

October 19th. Airport Committee. Installation of aerodrome lighting, erection of equipment and switchgear and laying of cables at Elmdon Airport. (September 9th.)

Braintree.—September 17th. R.D.C. Borehole pumping plant, consisting of one electrically driven unit and one oil-driven unit, for the northern area water supply scheme. H. E. Fellows, Council Offices, St. Peter's Close, Bocking (deposit £3 3s.).

Burton-upon-Trent.—September 21st. Corporation. 11,000-V p.i. lead-covered cable. (September 9th.)

Carlisle.—September 19th. Electricity Undertaking. Tungsten filament electric lamps for street lighting, traffic signals and general purposes. (September 2nd.)

Cheadle and Gatley.—September 19th. Electricity Department. Extensions to 6.6-kV switchgear for the Valley Road sub-station. (September 2nd.)

Chester.—September 26th. City Council. Electrical wiring at the City and County School extensions and new buildings. (September 9th.)

Coventry.—October 22nd. Electricity Department. One 30,000-kW turbo-alternator and auxiliary plant. Two water-tube boilers, auxiliary plant and buildings. (September 2nd.)

Dartford.—September 24th. Corporation. P.i., lead-covered and armoured cable. (September 2nd.)

Dublin.—September 23rd. Commissioners of Public Works in Ireland. Field lighting equipment comprising neon beacon, boundary lights, floodlights, illuminated wind tee, ceiling projector and indicator, wind speed indicator, airport traffic signal, control desk and switchgear. G. P. Fagan, secretary, Office of Public Works (deposit £2).

Ealing.—September 19th. Corporation. Street lighting mercury vapour discharge lamps. (September 9th.)

East Grinstead.—September 30th. U.D.C. A.c. and d.c. house service meters during the period ending March 31st, 1940. (See this issue.)

Egypt.—September 29th. Municipalities Department. One h.v. feeder between the electric power station and Kiosque Ahnouh at Assiut. (T. 26442/1938.)*

CAIRO.—October 6th. Four 25-kVA three-phase transformers. (T. 26668/38.)*

Exeter.—September 21st. Royal Devon and Exeter Hospital Committee. Electric lamps for six months. S. S. Cole, secretary and manager.

Exminster.—September 23rd. Devon Mental Hospital Committee. Electric lamps. C. Masters, clerk.

Fraserburgh.—September 17th. Town Council. Electrical works at thirty-six houses. Town Clerk (deposit £1).

Gloucester.—Electricity Undertaking. Electricity meters and p.i. cables. (See this issue.)

India.—CALCUTTA.—November 29th. Indian Stores Department. A.c. ceiling fans for twelve months. (T. 26200/38.)*

December 6th. D.c. ceiling fans for twelve months. (T.Y. 26196/38.)*

January 10th. A.c. and d.c. table fans for twelve months. (T. 26198/38.)*

MADRAS.—October 19th. Electricity Department. Mettur hydro-electric scheme extensions: Sixteen miles of 33-kV 0.03 sq. in. copper single-circuit line from Chittoor to Pakala. Nineteen miles of 11-kV 0.03 sq. in. copper single-circuit line from Pakala to Chandragiri. (T. 26699/1938.)*

Iraq.—BAGHDAD.—November 6th. Directorate General of Posts and Telegraphs. One automatic 5,000 line switchboard. (See this issue.)

Leyton.—October 17th. Corporation. Installation of electric lighting in proposed new library and lock-up shops, Harrow Green, E.11. (See this issue.)

London.—ISLINGTON.—September 16th. Borough Council. Three-phase e.h.v. switchgear. Borough electrical engineer, 341/3. Holloway Road, N.7.

SOUTHWARK.—September 26th. Borough Council. Electric cables for twelve months. (September 9th.)

COMMISSIONERS OF H.M. WORKS.—October 14th. Turbo-alternators and auxiliaries at Pembrey R.O.F. and Bridgend R.O.F., and switchgear, &c., for power station at Bridgend R.O.F. (See this issue.)

September 26th. One second-hand three-phase 400-V alternator coupled to Diesel engine for the Pembrey R.O.F. (See this issue.)

Malden and Coombe.—September 26th. Town Council. Pumps, motors, pipework and switchgear for the Kingston Vale pumping station. A. R. Goldthorp, borough engineer, municipal offices, New Malden, Surrey.

Manchester.—September 19th. Town Council. One 65-kW mercury arc rectifier, with transformer, switchgear, &c., at Longdendale Works. Committee secretary, Waterworks Offices, Town Hall (deposit £1 1s.).

September 26th. Electricity Committee. One emergency control board for 33-kV switchgear at Barton power station.

October 3rd. 6,600-V and 400/230-V overhead and underground transmission system and pole sub-station equipment. (See this issue.)

Melford.—September 28th. R.D.C. Electrically driven vertical-spindle centrifugal borehole pumps for the pumping station in course of erection at Great Cornard. Sands & Walker, Milton Chambers, Milton Street, Nottingham (deposit £2 2s.)

Midlothian.—September 30th. Twelve months' stores, including electrical fittings, for the Midlothian and Peebles District Asylum, Rosslynlee. Chilton L. Addison-Smith, clerk and treasurer, 19, Heriot Row, Edinburgh.

Morley.—September 21st. Housing Committee. Electrical work in connection with the erection of fifty houses and eight flats on the Churwell Park estate. Town Clerk, Town Hall (deposit £2 2s.).

Newport.—October 17th. Electricity Department. One electrically driven circulating water pump, switchgear and water-screening plant. (See this issue.)

New Zealand.—WELLINGTON.—October 18th. Public Works Department. One 1,000-kVA three-phase transformer. (T. 26119/38.)*

November 15th. Four 750-kVA units for transformer bank and spare at Tahekeroa sub-station (Arapuni—Section 615). (T. 26615/38.)*

October 25th. Posts and Telegraph Department. 4,000 yd. of flexible wire. (T. 26346/38.)*

October 6th. Conduits for lead-covered telephone cables. (T.Y. 26621/38.)*

Northumberland.—County Council. Electrical installation at the Morpeth new senior school. County architect, County Hall, Newcastle-on-Tyne.

Plymouth.—October 7th. Corporation. 33,000-V metal-clad switchgear, isolating units and control panels.

October 12th. Two 100,000 lb./hr. boilers with buildings and auxiliary equipment. (September 9th.)

Plympton St. Mary.—September 22nd. R.D.C. Wiring of forty houses on the Council's housing estate at Sparkwell. P. T. Loosemore, clerk, Council Offices.

Salford.—September 21st. Electricity Department. 6,600/400-V, three-phase power transformers.

September 27th. Rubber insulated cables. (September 9th.)

South Africa.—PRETORIA.—September 22nd. Public Works Department. Refrigerating plant at mortuary, Roodepoort. (T. 26022/38.)*

October 13th. Union Tender and Supplies Board. Motor-driven ringing generators for a.c. supply. (T. 26531/1938.)*

September 29th. One 7½-kW 110-V Diesel engine-driven electric lighting plant. (T. 26527/1938.)*

ALICE, CAPE PROVINCE.—September 19th. Municipality. A.c. motors with starters and electricity meters. (T.Y. 26378/38.)*

CAPE TOWN.—October 10th. Electricity Department. E.h.v. line material. October 18th. Circuit-breakers. (T.Y. 26383/38.)*

JOHANNESURG.—October 24th. Railways and Harbours Administration. Superheater elements for boilers. (T. 26597/38.)*

PORT ELIZABETH.—October 13th. City Engineer's Department. Electric fans. (T. 26742/38.)*

Southern Rhodesia.—SALISBURY.—October 6th. Electrical Department. Machine tools and an electric welding set. (T.Y. 26375/38.)*

Swindon.—September 22nd. Great Western Railway. Telephones, telegraph instruments and electrical apparatus. (September 9th.)

Uruguay.—MONTEVIDEO.—October 13th. Electricity Supply and Telephones Administration. Insulated copper conductors (Hackethal type). (T.Y. 25971/1938.)*

October 14th. 100,000 kg. bare copper conductors. (T.Y. 25970/38.)*

Wakefield.—September 26th. West Riding County Council. Installation of electric lighting in the extensions at Dinnington senior council school. Clerk of the County Council, County Hall.

Warrington.—September 19th. Electricity Department. E.h.v., l.v., p.i., lead-covered and other cables. Earthenware conduits and reinforced concrete cable protector slabs and tiles for twelve months. (September 2nd.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Bishops Stortford.—Council. Accepted. Electrical wiring at seventy-two houses (£405).—H. E. Danby & Co.

Cardiff.—Highways Committee. Accepted. Lighting Cowbridge Road (£15 13s. per point).—Revo Electric Co.

Dover.—Electricity Committee. Accepted. Transformers: One for the Air Ministry supply at Swingate (£110) and one for the Elms Vale estate (£141).—Foster Engineering Co.

Haltwhistle.—R.D.C. Accepted. Electrical installation at the Council offices.—A. Phillips.

Peterborough.—Recommended. Switchgear for the generating station (£13,363).—English Electric Co.

Accepted. Reactor and cables (£1,050).—Met.-Vick. Elecl. Co. Wiring the electricity showroom (£236).—Co-operative Society.

Plymouth.—Electricity and Street Lighting Committee. Recommended. One 6,600-V turbo-alternator unit with transformer to step up to 33,000 V, condensing plant and auxiliaries (£75,728).—Met.-Vick. Elecl. Co.

Wakefield.—Baths Committee. Accepted. Electric boiler and griller (£108).—J. Stott & Co.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Aberdeen.—Houses (68), Kaimhill, for T.C.; R. Mair, 17, Loch Street, Aberdeen.

Airdrie.—Municipal buildings, Clarke Streete; burgh surveyor.

Ashton-under-Lyne.—Houses, Hall Road, Smallshaw Lane, Warwick Road and Pollitt Avenue, for the Corporation; James Ridyard & Sons, builders, Railway Saw Mills.

Bedlington.—Houses (70), Church Lane; W. Hall, surveyor.

Birkenhead.—Clinic, Hamilton Square, and modernisation of Municipal hospital; borough engineer. Flats, Rose Mount; Victoria Estates (Wirrall), Ltd. Flats, Gerald Road; W. M. and M. W. Shennan.

Birmingham.—Block of shops and flats, Stratford Road, Shirley, for Healey & Baker, 29, St. George Street, Hanover Square, London, W.1. Block of shops and showrooms, Corporation Street, for Easterns, Ltd., East Ham, London, E.6. Extensions to Anstey Physical Training College, Chester Road, Erdington; W. Wilkinson, Ltd., contractors, Hutton Road, Handsworth.

Bradford.—Cinema and shops, Broadway; Associated Cinema Properties, Ltd. Extensions to Grammar school (£50,000); Governors. Extensions, St. Michaels School (£6,000); Diocesan Education Committee. Gymnasium, St. Thomas Church site; city architect.

Burton-on-Trent.—Houses, Branston; John Bannister & Sons. Extensions, Stapenhill Mission School (£8,097); Education Committee. Extensions, General Infirmary (£20,000); trustees.

Cardiff.—Houses (34), Ferry Road; Underwood & Chedzey. Buildings, Park Lane and Windsor Place; Hillier, Parker, May & Rowden, 27, Maddox Street, London, W.1.

Carlisle.—Houses (150), for workers at Air Equipment depot; city engineer. Shops and houses, Petteril Bank estate; city engineer.

Cheltenham.—Houses (22), Bafford Farm estate; Haddock & Merivale.

Cheshire.—School, Poynton, for the County E.C.; J. Clayton & Sons, builders, Catherine Street, Manchester Road, Denton, Manchester.

Chester.—School and extension to college for the Diocesan Church Schools Association; F. C. Saxon, Lockwood Abercrombie & Saxon, architects, 2, Stanley Street.

Colchester.—Library, Culver Street (£16,825); borough engineer.

Coventry.—Houses (500), Canby estate; city engineer. Block of shops and flats, Walsgrave Road; Marshall & Tweedy, architects, New Cavendish Street, London, W.1.

Darlington.—Houses, Hurworth Terrace and Neasham; R.D.C. surveyor. Hostel for Darlington Training College (£12,000); W. Sanders Hutton, Ltd., contractors, Post House Wynd, Darlington.

Denton.—Houses (76), Chapel Field estate; R.D.C. surveyor.

Derby.—Rebuilding and improvements to cinema, Witwell Street, Sponden, for the Sponden Cinema, Ltd.; L. F. Smith, architect, Deacons Bank Chambers, Corn Market, Derby.

Derbyshire.—School, Hollingwood, for E.C.; C. H. Hill & Son, builders, Victoria Street, Mansfield.

Essex.—School, Chingford (£45,642); county architect, Chelmsford.

Gateshead.—General hospital; F. H. Patterson, borough engineer, Town Hall.

Glamorganshire.—School, Bridgend, for the County E.C., Cardiff.

Glasgow.—Extensions to works, for L. Sterne & Co., Ltd., Woodside Road.

Hatfield (YORKSHIRE).—School, Doncaster Road; clerk to Council, Council Offices, Thorne, Yorkshire.

Hawick.—Extensions to public library (£2,000); librarian.

Hebburn-on-Tyne.—Houses for North-Eastern Housing Association; Page, Son and Bradbury, architects, 75, King Street, South Shields. Houses and shops, Auckland Road; J. M. Black, Ltd., builders, Grange Road West, Jarrow-on-Tyne. Flats (16), Vimy Avenue; R. Finn, estate agent, Winchester Street, South Shields.

Houghton-le-Spring.—Houses (14½-acre site); U.D.C. surveyor.

Hyde.—Development of Walker estate; borough engineer.

Kent.—Enlargement of county hospital, Farnborough, and extensions to Central school, Dartford; county architect, Maidstone.

Kettering.—Houses (100), Avondale estate; U.D.C. surveyor. Extensions to works, Trafalgar Road, for Acquascutum, Ltd.

Kirkcaldy.—Hall, Park Road (£8,000), for T.C.

Lanarkshire.—School, Calderwood Road, Rutherglen; county architect, Hamilton.

Langley.—Aircraft factory, for Hawker Aircraft, Ltd., Kingston-on-Thames.

Liverpool.—Office block, Dale Street, for the Eagle Star Insurance Co.; A. E. Shennan, architect. North John Street. Offices and showrooms, Bold Street, for Watson & Co., Ltd.; Rimmer Bros., builders, Dalton Street.

London.—(CATFORD).—Houses (60), Woodham Road; Wates, Ltd.

Market Harborough.—Houses, Bath Street; C. Page.

Middlesex.—School, Garden estate, Ruislip (£37,742), for the County E.C.

Motherwell.—Extension to silk factory (£4,000); Anderson and Robertson.

Newburn-on-Tyne.—Fire station; U.D.C. surveyor.

Newcastle-on-Tyne.—Houses (14), Baldwin Avenue; W. Smelt, contractor, Severus Road. Houses, Cragside for H. Storey, and flats, Addicombe Terrace, for J. J. Hedley; Marshall, Tweedy and Bourn, architects, Grainger House, Blackett Street, Newcastle. Extensions to the premises of A. E. Bedson, New Bridge Street; S. H. Lawson, architect, Emerson Chambers. Extensive alterations to premises of Rowland Blaylock, Ltd., New Bridge Street; A. H. Fennell & Co., architects, 16, West Street, Gateshead.

Northampton.—Block of shops and offices, Abingdon Street; H. Martin, Ltd., builders, Thenford Street.

Northumberland.—Gymnasium for Gosforth school; county architect, County Hall, Newcastle-on-Tyne.

Pontefract.—Houses, Monkhill; borough engineer. School, Carleton Park, for E.C.

Portsmouth.—Extensions, Grove Road school; Education Committee. Library, Kingston Road (£45,000); city architect. Extensions, Marina Factory, Highland Road; Leethams (Twilfit) Co., Ltd. Houses (12), Grove Road, Drayton; E. E. Wilson.

Prudhoe-on-Tyne.—Cinema; Coxon and Doherty, contractors, Station Street, Blyth.

Rutherglen.—Paper mill for Scottish Co-operative Wholesale Society, Ltd.; architect, Scottish C.W.S., Glasgow.

Salisbury.—Garage and offices for Wilts and Dorset Motor Services, Ltd.; Harding & Son, architects, 65, New Street.

Saxmundham.—Extensions to showrooms; G. Wightman & Sons.

Scarborough.—Reconstruction of Olympia ballroom; borough engineer.

Sheffield.—Extensions to works, for Geo. Oxley & Sons, Attercliff Road; B. Powell & Son, contractors.

Shropshire.—School, Ketley; A. G. Chant, architect, 5, Belmont, Shrewsbury.

Sleaford.—Houses (61), North Road; U.D.C. surveyor.

Slough.—Extensions to works for Lisson Aircraft & Precision Engineering Co., Ltd., 103, Farnham Road.

Somerset.—School, Ansford (£38,267), for the County E.C.

Stockport.—Cinema at the junction of Denby Lane and Manchester Road, Heaton Norris, for Empress (Heaton Norris), Ltd.; C. E. Gaunt & Son, Ltd., builders, West Bars, Chesterfield.

Sunderland.—Alterations to premises, Borough Road, for A. Share and Sons; Stephenson and Gillis, architects, Saville Place, Newcastle-on-Tyne. Alterations and extensions to premises for H. & S. Corder, 25, John Street, and reconstruction of premises for Steel & Co., Holmeside, Sunderland; G. E. Matkin, architect, Barclays Bank Chambers. Rebuilding of White's Market (£16,000); J. Huntley & Sons, contractors, Marion Street.

Swindon.—Houses (12), Collett Avenue; E. H. Bradley & Sons. Houses (29), Upham Road; Colbnornes Estates, Ltd. School, Ferndale Road (£12,580); Spackman & Sons. Extensions to factory, Newcastle Street; E. W. Beard, Ltd. Extensions to Queenstown school (£7,767); R. J. Leighfield & Sons, Ltd.

Torquay.—Alterations and additions to premises, 4-6, Strand; Williams & Cox.

Wakefield.—Houses, Darnley and Portobello estates, and buildings, for Cathedral senior school; city architect. Extensions to library (£2,497); G. Crook & Sons, Ltd.

Walsall.—Cinema, The "Avion," Lichfield Road, Rushall (£30,000); R. Satchwell, architect, 6, New Street, Birmingham. Estate development, Wood Road, Aldridge; L. Dickinson.

Wardley (CO. DURHAM).—Hall and institute for the miners' lodge; T. G. Price, builder, 1, Albion Terrace, Springwell.

Wath-upon-Dearne.—Houses (80), Newhill estate; U.D.C. surveyor.

Wednesbury.—Rebuilding hotel premises, High Street; John Webb & Son, builders, High Street, Coseley.

West Herrington (NEAR SUNDERLAND).—Houses (20), for Sunderland R.D.C.; H. Hitchen, R.D.C. surveyor.

Whickham (CO. DURHAM).—Shops and business premises; Shields Bros., contractors, Back Park Lane, Swalwell, Whickham.

Wortley.—Houses (286), various parishes; R.D.C. surveyor.

York.—Shops and offices, Davygate and New Street; Malton Investment Trust, Ltd. Senior schools, Gale Lane (Acomb) and Water Lane, and extensions to Woodroyd school; city architect. Municipal offices; Considere Constructions, Ltd., consultants. Stores, Poppleton Road; British Sugar Corporation, Ltd.

Yorkshire.—Alterations to the Lockton (Pickering) School, for the North Riding Council; county architect, County Hall, Northallerton.

Educational

THE day and evening sessions at the Battersea Polytechnic commence on September 26th. Entrance examinations to the day college commence on September 20th, and enrolments for the evening class on September 22nd.

Enrolment begins on September 19th for the day and evening courses at the Borough Polytechnic.

Classes in electrical engineering open at the L.C.C. technical institutes on September 26th.

(See our classified advertisements.)

Appointments Vacant

Clerk for Bridport Electricity Department.

Storekeeper for Dover Electricity Department.

Executive engineer for the Electrical Branch of the Department of Communications and Works, Government of Bengal.

(See our classified advertisements.)

Personal and Social

Information regarding new appointments and other matters of interest for this page are welcomed

AFTER twenty-two years' service **Mr. F. C. Thornber** retired from the position of manager of the Leeds office of George Ellison, Ltd., on September 5th, and he has been succeeded by **Mr. H. Copping,** manager of the Glasgow office, who

Mr. H. Copping

Mr. J. C. Stewart

received his training at the company's Leeds office. **Mr. J. C. Stewart,** formerly manager of the Glasgow office of the Harland Engineering Co., Ltd., has been appointed to succeed Mr. Copping at the Glasgow office of George Ellison, Ltd.

Dr. A. P. M. Fleming will sail from New York for England in about a week's time. During his stay in America he has spent some weeks visiting fellow scientists in Canada and the United States.

Mr. C. Ormerod, deputy general manager of the Bolton Corporation Transport Department, has been appointed general manager in succession to the late Mr. J. Barnard, at a salary of £1,000 per annum. Mr. Ormerod joined the Bolton Transport Department thirty-nine years ago as a junior clerk, when horse trams were running. In 1913 he was appointed chief clerk and three years later he became chief traffic assistant. He was appointed deputy transport manager in July, 1935, and has since that date supervised not only the operation of bus services but the maintenance side of the work. It has been one of Mr. Ormerod's duties to attend Traffic Commissioners' courts on behalf of the transport undertaking since their inception, to prepare evidence and submit applications for services.

Mr. C. Ormerod

Mr. Russell Cairns will be installed as president of the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-on-Tyne on October 14th when he will deliver his presidential address.

Mr. L. G. Southgate, sales engineer with the North Metropolitan Electric Power Supply Co. at its Hertford branch, was married recently to Miss Mary E. Martin. Miss Martin was also in the employ of the "Northmet" Co.

Capt. G. J. Scott, B.Sc., M.I.E.E., has been appointed chairman of Laurence, Scott & Electromotors, Ltd., in succession to his father, the late Mr. W. H. Scott. Capt. Scott, who is forty-eight, was educated at Willaston School and the City and Guilds of London College. During the war he served for eighteen months as a lieutenant in the Royal Field Artillery, and for two and a half years in the R.A.F. as pilot and flight-commander. He was awarded the Distinguished Flying Cross in 1918 while on service in France, and was wounded in September of that year.

Capt. G. J. Scott

Capt. Scott was appointed a director of Laurence, Scott & Co., Ltd., in 1922, and became managing director of Laurence, Scott & Electromotors, Ltd., in 1936.

Mr. H. G. Elstob, who is senior assistant engineer in the control room of the Dunston power station of the North-Eastern Electric Supply Co., Ltd., has been appointed lecturer in the electrical engineering department of the Salford Technical College.

Mr. A. Taylor, whose appointment as engineer and manager of the Heckmondwike U.D.C. Electricity Department we recently announced, joined the staff of the electricity undertaking at an early age, more than twenty-three years ago. He received his electrical training at the Dewsbury and Bradford technical colleges, and has held the position of commercial and sales engineer at Heckmondwike for several years. During this period the number of consumers has increased from 160 to 2,500, and the sales of electricity from 980,000 kWh to 2,762,000 kWh. A wiring scheme was introduced, the first in the surrounding districts, and has resulted in 88 per cent. of the homes of Heckmondwike being wired. The introduction of domestic appliance hire and hire-purchase has resulted in one in every eight homes having a cooker, kettle and wash boiler installed. The undertaking was the first in the heavy woollen district to offer a domestic tariff to consumers with a "unit" charge of ½d. Mercury discharge street lighting has also been introduced. Mr. Taylor played an important part when the plant was changed over from steam generation to rotary converting plant in 1924-25, and in addition to his ordinary duties he has recently acted as clerk of works in connection with the change-over from d.c. to a.c.

Mr. A. Taylor

Mr. J. H. Maltby, of Harrow, has been appointed distribution engineer to the Torquay Corporation Electricity Department at a salary of £550 a year.

In referring to the paper on "Incremental Permeability Testing" by **Mr. D. C. Gall** in our report of the recent British Association meeting at Cambridge we regret that the author's name was mis-spelt. Mr. Gall is the proprietor of H. Tinsley & Co.

In our "City" section today we give particulars of the merger of the Brush Electrical Engineering Co., Ltd., and Petters, Ltd. **Mr. T. B. Keep,** O.B.E., M.I.Mech.E., M.Inst.T., whose portrait we reproduce herewith, is managing director of both concerns.

Mr. T. B. Keep

Mr. E. B. Wright, electrical engineer to the Rhyl Urban District Council, has resigned from that position. Mr. Wright succeeded his brother, Mr. E. H. Wright, as electrical engineer in 1920.

Mr. A. E. Boon, district mains engineer of the Romford district of the County of London Electric Supply Co., Ltd., has retired, and at a recent smoking concert he was presented by the staff with a cocktail cabinet, and Mrs. Boon received a silver salver. Previously Mr. Boon was presented with a gold inscribed cigarette case at a dinner of the company's engineering staff at the Holborn Restaurant.

Obituary

Dr. C. C. Carpenter.—We regret to report the death, on September 7th, of Dr. Charles Claude Carpenter, C.B.E., D.Sc., formerly president of the South Metropolitan Gas Co., at the age of eighty. He was responsible for many innovations in the gas industry, but most important of all was his part in the introduction of the therm system of charge. He also introduced the basic price and basic dividend system, which has since been adopted for undertakings supplying more than half the gas in Great Britain and has also been applied to the London electricity companies.

Sir Basil Mott, Bt.—The death occurred on September 8th, at his home at Hampstead, of Sir Basil Mott, Bt., C.B., F.R.S., the consulting engineer. Sir Basil, who was seventy-eight, was responsible for many important constructions, including the City and South London Electric and Central London Railways, and he also helped in the building of the Mersey Tunnel.

Mr. J. J. Loftus.—The death is announced of Mr. J. J. Loftus, chief electrical engineer, Aldershot Command, which occurred on August 26th.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Battery Traction, Ltd.—Private company. Registered September 6th. Nominal capital, £82,000. Objects: To carry on the business of suppliers of electrically propelled and other vehicles, manufacturers of and dealers in cars, vans, lorries, trucks, carriages and vehicles of every description; batteries, accumulators, component parts, accessories and fittings, engines, motors, chassis, bodies and frames; garage keepers, suppliers of and dealers in electricity and other motive power for such vehicles, &c. The subscribers are: C. A. Fisher, 39, Moffats Lane, Brookmans Park, Herts, and E. Edwards, 5, Mayfair Avenue, Whitton, Mddx. The directors' borrowing powers are restricted to an amount not exceeding the company's issued nominal capital. Registered office: 4, Dean's Yard, Westminster, S.W.1.

Zet-Ozone (1938), Ltd.—Private company. Registered September 6th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in air-conditioning plant of all kinds, electrical and other apparatus for the production of ozone, &c. The first directors are Mrs. P. J. Morris, Mrs. C. Marley and J. Zetsche. Solicitor: Morris J. H. Leverton, 202, Bishopsgate, E.C.

G. F. Coltman, Ltd.—Private company. Registered September 7th. Capital, £100. Objects: To carry on the business of general engineers and toolmakers, manufacturers and repairers of and dealers in mechanical and electrical parts, machines and contrivances, moulders and manufacturers of articles made with any synthetic or plastic or other materials, &c. The directors are: G. F. Coltman, 8, Warren Road Barkingside, Essex, and Miss P. G. Short, 16, St. Albans Crescent, Woodford Green, Essex. Secretary: G. F. Coltman. Registered office: Forest Works, St. Albans Road, Woodford Green.

Photoradio, Ltd.—Private company. Registered September 5th. Capital, £1,000. Objects: To carry on the business of manufacturers and repairers of, agents for and dealers in wireless and television sets, accessories and apparatus, cinematograph apparatus, &c. The subscribers are: Miss E. Cabanes, Netheracres Cottage, Martello Road, Canford Cliffs, Dorset, and W. F. W. Edwardes, The Corner, Wareham Road, Corfe Mullen, Dorset. Miss E. Cabanes is a permanent director.

Lighting Equipment (Eca-Ray), Ltd.—Private company. Registered September 6th. Capital, £100. Objects: To carry on the business of dealers in electrical fittings, apparatus and components, &c. The subscribers are: A. F. Dougall, 18, Croft Road, Norbury, S.W.16, and A. S. Jesson, 8, Ethronvi Road, Bexley Heath, Kent. Secretary: H. D. Hatton. Registered office: Aldwych House, Aldwych, W.C.2.

Lighting Glass Agencies, Ltd.—Private company. Registered September 6th. Capital, £100. Objects: To carry on the business of manufacturers, exporters, importers, retailers and wholesale dealers in glass, glassware and fittings of all kinds, lampshades, electrical and other lamps, lights and fittings, &c. The subscribers are: H. Hammond, 20, Meadow Road, Pinner, and J. Wyatt, Woodleigh, Arundel Road, Eastbourne. Secretary: H. Hammond. Registered office: 25-27, Oxford Street, W.1.

G. A. Davenport, Ltd.—Private company. Registered September 9th. Capital, £1,000. Objects: To acquire the business of an electrical contractor, engineer and dealer now carried on by Geo. A. Davenport at 20, High Street, Pinner, Middlesex, as the General Electrical Maintenance Co. G. A. Davenport, Dormers, Avenue Road, Pinner, Middlesex, is first and permanent managing director. Registered office: 20, High Street, Pinner, Middlesex.

Multi-Ray Heaters, Ltd.—Private company. Registered September 5th. Capital, £2,000. Objects: To carry on the business of heating, lighting, electric, hydraulic, automobile and general engineers, electricians, &c. The permanent directors are: L. A. Doughty, 61, Strawberry Lane, Carshalton, W. Hall, 53, Shirehall Park, Hendon, N.W.4, and F. H. Kenton, 1, Wonersh Way, Cheam, Surrey. Secretary (*pro tem*): N. A. Lacey. Registered office: Dorland House, 14-16, Regent Street, S.W.1.

Neon Rentals, Ltd.—Private company. Registered September 5th. Capital, £2,101. Objects: To lend money and enter into hire-purchase agreements; and to carry on business as manufacturers, makers and erectors of signs and illuminations of all descriptions, &c. The permanent directors are: E. S. Davis, 35, The Park, Golders Green, N.W.11, and three others. Secretary: C. S. Levy. Registered office: 25-27, Oxford Street, W.1.

Jeakings, Son, & Co., Ltd.—Private company. Registered September 10th. Capital, £1,500. Objects: To carry on the business of radio, electrical, television, mechanical and general engineers, etc. The first directors are: R. Jeakings, 128, Hurst Grove, Bedford, and H. R. Jeakings, 2, Cutcliffe Gardens, Bedford.

Arlow Engineering Co., Ltd.—Private company. Registered in Dublin September 2nd. Capital, £1,000. Objects: To carry on the business of merchants, founders, workers of, agents for and dealers in all kinds of internal combustion engines, steam, electric and other engines, &c. The directors are: W. J. Arlow, Northbrook Terrace, North Strand, Dublin; M. Farrell, Seafield Road, Clontarf, Dublin; and T. Biggs and Katherine Manning, addresses not stated.

S. J. Wright, Ltd.—Private company. Registered September 9th. Capital, £2,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, &c. The subscribers are: S. J. Wright, 20, Earl Street, Maidstone, and S. Mernham, 46, Heather Drive, Maidstone. S. J. Wright is the first director.

G. Scott Sessions & Co., Ltd.—Private company. Registered September 8th. Capital, £100. Objects: To acquire the business of a wireless engineer carried on by G. S. Sessions at Exchange Works, Duke's Avenue, Muswell Hill, N., as G. Scott Sessions & Co. The subscribers are: E. Sessions, 19, Church Vale, East Finchley, N.2; and G. S. Sessions, Whitehall Lodge, Page's Lane, N.10. G. S. Sessions is a permanent director and chairman.

Returns of Electrical Companies

Richmond (Surrey) Electric Light & Power Co., Ltd.—Capital, £400,000 in £1 shares. Return dated April 12th, 1938. 310,000 shares taken up. £200,000 paid. £110,000 considered as paid: Mortgages and charges nil.

British Insulated Cables, Ltd.—Capital, £3,000,000 in £500,000 5½ per cent. A preference stock, £500,000 6 per cent. preference stock and £2,000,000 ordinary stock. Return dated April 15th, 1938. All stock taken up. £2,572,675 paid. £427,325 considered as paid. Mortgages and charges, £700,000.

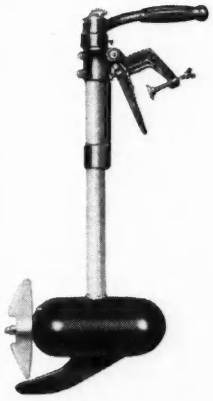
Erskine Heap & Co., Ltd.—Capital, £50,000 in 100,000 shares of 10s. each. Return dated April 10th, 1938. 46,489 shares taken up. £4,413 paid on 8,826 shares. £18,831 10s. considered as paid on 37,663. Mortgages and charges nil.

Paignton Electric Light & Power Co., Ltd.—Capital, £100,000 in 100,000 shares of £1. Return dated April 27th, 1938. 90,000

An Electric Outboard Motor

THE petrol driven outboard Motor now so popular for river travel is apt to prove objectionable because of its noise and fumes, especially when running in quiet backwaters.

An electric outboard motor has now been introduced to the British market by ARTHUR BRAY, 146, Marylebone Road, London, N.W.1. It weighs 20 lbs. is rated at ½ h.p. (360 W), and will operate from a 12-V car battery (very slowly from a 6-V battery).



The "Eclipse" electric outboard motor

The equipment can be fixed to the stern transom of a dinghy or to an "outboard" bracket affixed to a punt, exactly as in the case of the usual petrol outboard motor. It pushes along a 12 ft. dinghy containing four adults at a good four knots as compared with the six knots of the smallest petrol outboard made, which is rated at 1 h.p. Among its advantages are silence, cleanliness and simplicity of starting. It is no heavier than a petrol outboard and the car battery necessary to operate it can be placed in the bows in order to trim the boat by counterbalancing the weight of the motor. The ordinary petrol type also possesses the disadvantage that, as the motor is mounted out of the water, bevel gears have to be used to transmit the power to the propeller and a pumping system has to be employed for circulating cooling water round the engine. The electric outboard is totally submerged the propeller being mounted directly on the end of the armature shaft thus avoiding all transmission losses. A rubber gland keeps water from entering *via* the propeller-shaft tunnel, and means are provided for detecting instantly when the gland is beginning to deteriorate when it can easily be changed.

A tiller is provided for steering the motor, and, by means of this the whole motor can be turned through an angle of 180 degrees to provide a reverse movement. The motor projects slightly below the bottom of the boat and the propeller is protected by a special fixed fin.

It is preferable to use two 6-V batteries in series to one 12-V battery as they are available in much heavier capacities. Speed can be controlled by fitting, at any convenient position in the boat, a series-parallel switch. This is used instead of the switch provided on the motor, so that the operator need not sit in the stern of the boat. At full speed two standard 6-V car batteries of 144 Ah capacity give a continuous running time of over three and a half hours.

shares taken up. £60,000 paid. £30,000 considered as paid. Mortgages and charges nil.

City of London Electric Lighting Co., Ltd.—Capital, £2,400,000 in £400,000 6 per cent. 1st preference, £300,000 8 per cent. 2nd preference, and £1,600,000 ordinary in £1 units, leaving £100,000 unclassified. Return dated March 30th, 1938. 400,000 first preference, 300,000 second preference and 1,600,000 ordinary shares taken up. £1,500,000 paid on first and second preference and 800.000 ordinary. £800,000 considered as paid on 800,000 ordinary. Mortgages and charges, £540,383.

Trent Valley & High Peak Electricity Co., Ltd.—Capital, £200,000 in £1 shares. Return dated March 16th, 1938. All shares taken up. £210.666 13s. 4d. paid (including 2s. 8d. per share premium on 80,000 shares). Mortgages and charges, nil.

Bournemouth & Poole Electricity Supply Co., Ltd.—Capital, £1,300,000 in 75,000 4½ per cent. cumulative preference, 325,000 6 per cent. cumulative preference, and £154,231 ordinary shares of £1 and £745,769 ordinary stock. Return dated April 12th, 1938. 75,000 4½ per cent. preference, 190,250 6 per cent. preference shares and £745,769 ordinary stock taken up. £550,000 paid on 75,000 4½ per cent. preference and £175,000 6 per cent. preference shares and £300,000 ordinary stock. £461,019 considered as paid on the remainder. Mortgages and charges, £400,000.

Mawdsley's, Ltd.—Capital, £50,000 in 25,000 preference and 25,000 ordinary shares of £1. Return dated April 4th, 1938. All shares taken up. £44,000 paid. £6,000 considered as paid. Mortgages and charges, nil.

Concordia Electric Safety Lamp Co., Ltd.—Capital, £100,000 in £1 shares. Return dated March 23rd, 1938. All shares taken up. £100,000 paid. Mortgages and charges, nil.

Britannia Electric Lamp Works, Ltd.—Satisfaction in full on August 15th, 1938, of mortgage registered July 21st, 1938. (According to the register of mortgages, the only deed registered July 21st, 1938, was a charge which originally secured all moneys due to bank.)

Suflex, Ltd.—Satisfaction in full on August 22nd, 1938, of debentures authorised August 1st, 1933, and registered August 2nd, 1933, securing £1,000.

Devon Electric and General Services, Ltd.—Satisfaction in full on August 12th, 1938, of mortgage dated May 7th, 1937, and registered May 10th, 1937. (According to the register of mortgages, the mortgage registered May 10th, 1937, originally secured £1,818.)

Illuminated Publicity, Ltd.—Satisfaction to the extent of £1,000 on August 16th, 1938, of debentures authorised February 11th, 1938, and registered February 24th, 1938, securing £2,000.

United River Plate Telephone Co., Ltd.—Satisfaction in full on July 6th, 1938, of trust deed dated June 14th, 1907, and registered July 1st, 1907, securing £300,000 debenture stock.

Neil and Spencer, Ltd.—Particulars filed of debentures not exceeding £750, authorised August 16th, 1938, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £750.

Cray Electrical Motors, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital. dated August 14th, 1938, to secure £500. Holder: A. W. Scott, 7, Staple Inn, W.C.1.

British Sangamo Co., Ltd.—The nominal capital has been increased by the addition of £6,000 beyond the registered capital of £150,000. The additional capital is divided into 12,000 ordinary shares of 10s. At April 8th, 1938, the Sangamo Electrical Co., of Springfield, Illinois, U.S.A., held 160,215 shares out of 300,000 issued.

City Notes

Petters-Brush Agreement.—The directors of Petters, Ltd., have issued a circular in which they state that, in pursuance of their declared policy of concentrating manufacture, an agreement has been entered into by which the Brush Electrical Engineering Co., Ltd., acquires the assets, other than land and buildings, and the business relating to the manufacture of oil engines hitherto carried on by Petters at Yeovil. The purchase price in respect of machine tools and current assets is £265,000, and is to be satisfied by the allotment to Petters of 200.000 5½ per cent. cumulative £1 preference shares ranking for dividend from April 1st, 1939, and £65,000 £1 ordinary stock in the reconstructed capital of the Brush Electrical Engineering Co. In consideration for goodwill, patterns, &c., Petters will also receive an annual commission on the turnover of the oil-engine department for ten years, varying with the value of such turnover and the contribution to overhead expenses derived from it. The plant and machinery will be transferred from Yeovil to Loughborough where the existing buildings of the Brush Co., afford adequate accommodation for the layout of modern production and line assembly. Mr. T. B. Keep will continue as managing director of the Brush Co., and complete arrangements have been made to avoid any break in the continuity of manufacture or in the service and sale of Petter products. The transfer of the business to the Brush Co. will be completed by January 1st, 1939. An extraordinary meeting of the shareholders of Petters will be called at a later date for the purpose of changing the name of the company so that the present name and the goodwill attached to it may be available to the Brush Co. for the sale of Petter products The freehold land and buildings at present occupied by Petters at Yeovil have been disposed of to Westland Aircraft, whose works immediately adjoin them, in consideration of the allotment to Petters of 600.000 ordinary shares of 5s. each in Westland Aircraft. This, including the premium on the shares, represents a purchase price of £187.500. The greater part of the holding of Petters in Westland Aircraft has been purchased by John Brown & Co., and the remainder is held under option for a limited period to the latter company. As a result of these transactions Petters will become a holding company. The company was formed in 1895.

The Wilkes Berger Engineering Co. is holding a meeting on October 6th at which proposals will be submitted for increasing the capital from £100,000 to £160,000 by the creation of 60,000 £1 5½ per cent. redeemable preference shares. If the proposal is approved the company will forthwith offer the shares at par to existing holders. The Prudential Assurance Co. has underwritten the issue for a commission of 2½ per cent. The company acquired last year the share capital of Beethoven Electric Equipment, Ltd., whose assets include a factory at North Acton. The board states that it has become evident that further economies can be effected by consolidating the whole of the manufacturing processes of the present three separated London premises into one factory at North Acton. The Birmingham works will not be affected. The directors have therefore decided to acquire the freehold interest and extend the existing factory buildings at North Acton. The cost of the scheme is estimated at approximately £35,000. The present issue will provide £25,000 additional working capital.

J. & F. Stone Lighting and Radio, Ltd., reports trading profits for the year ended June 30th of £83,704, as compared with £93,360 in the preceding year, less amortisation of leases and depreciation, and directors' fees (£8,900). Preference redemption receives £5,850 and tax reserve, including N.D.C., £10,000. The final ordinary dividend is 5 per cent., making 10 per cent. for the year (against 17½ per cent.), general reserve receives £5,000, and £7,738 is carried forward. In view of conditions the directors regard the results as satisfactory. Subsidiaries' profits are not included. The principal subsidiary, a hire-purchase finance business, has made further progress and has shown increased revenue notwithstanding that during the year the parent company withdrew certain trade discounts hitherto granted.

The Harland Engineering Co., Ltd.—Particulars were published on Wednesday for an offer for sale on Thursday of 140,554 6 per cent. cumulative preference shares of 10s. at par and 340,370 ordinary shares of 5s. at par. The company has an authorised capital of £300,000, of which £240,000 has been issued. The average profits for the past three years amount to £18,700, covering the £6,000 required for the preference dividend over three times and nearly five times by profits for the year 1937. After providing this dividend there would remain a sum available for reserves and dividends on the issued ordinary shares equal to 9.08 per cent. on the basis of the average profits for the last three years, and 16.25 per cent. on the basis of the profits for 1937. These calculations are made before deducting income tax but after deducting estimated N.D.C. The company manufactures electrical machinery and centrifugal pumps for industry, water and sewage services.

Callender's Cable & Construction Co., Ltd., is maintaining its interim dividend on the ordinary capital at 5 per cent., less tax.

The Electric Supply Corporation, Ltd., has announced an interim ordinary dividend of 3½ per cent., less tax (unchanged).

The Scottish Power Co. has declared an interim dividend of 2½ per cent. (same).

Hoover, Ltd., is maintaining its interim dividend at 5 per cent.

Ward & Goldstone, Ltd., are paying the usual interim dividend on the cumulative preference shares at the rate of 7 per cent. per annum.

Stocks and Shares

TUESDAY EVENING.

THE slight relief offered to Stock Exchange markets by what seemed to be a postponement of a clash in arms in Europe was quickly dissipated by the sequel to Herr Hitler's speech; namely, the proclamation of a state of emergency in five districts in Czechoslovakia and reports as to disturbances which had broken out, resulting in loss of life. These "incidents" put an effective check upon a subdued form of hopefulness that had appeared in the Stock Exchange markets. Gilt-edged issues at first rose ½ to ¼ only to relapse almost immediately afterwards. Prices have been susceptible to every breath of rumour or of news. A touch of ironical humour was supplied by a strengthening of markets on Monday, on the report that Marshal Goering had been sent to bed for a few days on account of sickness. War Loan stands at about 100, and other British Government stocks have weakened. The prices in our lists are steady as a whole. Cable and Wireless stocks show the most obvious weakness.

Gilt Edged Stocks

Prices of British Government stocks, as just noticed, are flat; there has been a good deal of selling on account of the crisis. Falls which occurred in this group found some reflection in the quotations for gilt-edged securities of every description. Where prices have not been quotably changed this is hardly an indication of any exceptional strength. It means, as often as not, that dealers in these issues have left the prices standing because of there being no particular business passing in the stocks for the time being. Central Electricity descriptions have been very little altered. London Passenger "C" stock is 10s. higher, at 75.

London and Home Counties

The London and Home Counties Joint Electricity Authority met in London on Monday of this week, to discuss recommendations put forward by the finance committee with a view to adjusting the widening disparity between costs and revenue. The Authority, faced with a deficit which under present conditions seemed bound to increase, decided to revise its charges in a manner that would obviate the likelihood of a loss being shown in 1940. In order to accomplish this, it has been decided to add 10 per cent. to accounts for electricity consumed starting at once. Additions are also to be made

to the rentals for electric cookers, and meters. The London and Home Counties J.E.A. operates at present about 200 square miles within Middlesex and Surrey. Its supervisory powers, however, extend over 1,800 square miles. The price of the 4½ per cent. stock is left unchanged at 112½.

Electricity Supply

We are accustomed to see a regular upward trend in the course of electricity output in this country. In other words, a general slackening of trade does not prevent people and industries from using an ever-increasing amount of current. For many years an expansion in the Electricity Commissioners' monthly output statements has come to be taken almost for granted by the companies' stockholders. The latest figures, however, are set against a trade background in which contraction rather than expansion is the order of the day.

One of the main attractions of holding electricity shares is the prospect of receiving a stable dividend on capital increased from time to time by new issues on bonus terms. Prices have given way this week in one or two places. Both North Metropolitans, at 47s. 6d., and Electrical Distribution of Yorkshire, at 42s. 6d., are 1/6 lower. Victoria Falls at 67s. 6d. are a dull spot in the overseas group.

Callender's Cable Dividends

The interim dividend of 5 per cent. declared by Callender's Cable and Construction is the same as that paid on the ordinary capital for at least a decade. Until 1936 the interims had been followed regularly by finals of 10 per cent. In the last two years shareholders have had a 5 per cent. cash bonus tacked on to the regular total of 15 per cent. On only one occasion in recent years has the company distributed more than the earnings available: usually there has been a wide margin between the latter and the cost of the dividend. In each of the past two years, for instance, profits covered the 20 per cent. payments twice over. The results of this conservatism are to be seen in the reserve of a round million pounds, which is only slightly less than the nominal amount of ordinary stock in issue. Hopes of advantages to come from the projected link with Crompton Parkinson are another reason why the yield on the ordinary shares at 4⅝ is well under 4½ per cent.

Brush and Petters

Since last May, when members of Petters joined the board of Brush Electrical Engineering, the market has been expecting a closer association of the two companies. There was no surprise, therefore, in the news that Brush is to take over Petters' oil-engine business, the mechanical equipment of which will be transferred to the Brush Company by the beginning of next year. The consideration is all in Brush shares, Petters being allotted 200,000 of 5½ per cent. preference and 65,000 of £1 ordinary. It appears that the transfer will involve as little disturbance as possible in the continuity of service and sales, the very extensive organisation of which seems likely to make fresh openings for the Brush Company. Altogether, the market looks favourable on the merger as it affects the stockholders concerned. The price of Brush units, at 5s. 3d., was not affected. Petters, on the other hand, had a spectacular jump from 37s. 6d. to over 45s.

Cable and Wireless

A further decline of 25 points in British Electric Traction deferred stock to 875, is of less general interest than a drop of 5, to 88½, in Cable and Wireless preference, and of 4½, to 40, in the ordinary stocks. The flatness is attributable to the impression that the present world disturbance must inevitably react upon the earnings of communication companies. Anglo-American Telegraph stocks have weakened. Globe Telegraph & Trusts are unchanged.

Amongst the dollar issues, Brazilian Tractions gave way ½ to 11¼, and Mexican Light 5 per cent. bonds lost 3, going back to 22½. The American market is in an extremely sensitive condition. Fluctuations are violent and frequent. Business in the United States is improving, but not even Wall Street can escape the malinfluence of the European war-clouds.

London Passenger Transport Stocks

Within the course of the next few weeks the London Passenger Transport Board will be declaring its dividends, and will thereby set at rest the doubt as to what distribution the "C" stock is likely to obtain. If the statutory 5½ per cent. is not paid this year, then 5 per cent. of the holders of any class of the Board's stocks can apply for the appointment of a Receiver. The mere suggestion of such a thing is sufficient to arouse a mild amusement. If the matter were pressed to its extremity, Londoners might see buses running with labels on them: "This is the property of the 'A' Debenture stock," or trams, giving with the direction boards the notification that the vehicle belonged to some other class of the Board's issues, while the tube trains might bear similar notices in favour of other stockholders.

Ludicrous as the idea might seem, it has actually been put into operation, in years gone by, on some of the American railroads that went into liquidation. Further back still, Stock Exchange legend is wont to recall the days when the old Great Eastern Railway fell into such financial difficulties that on some of the rolling stock, notices were affixed saying that this engine, train, or station platform, whatever the case might be, belonged to certain classes of the company's stockholders.

Share List of Electrical Companies

	Dividend. Nom.	Previous.	Last.	Price Sept. 13.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole ...	1	15	15	66/3	—	4 10 7
City of London	1	7½	7½	33/–	–	4 9 7
Clyde Valley	1	7	8	37/–	—6d.	4 6 6
County of London...	1	10½	10½	48/6	–	4 6 7
Edmundson's 7% Pref.	1	7	7	32/6	—	4 7 6
Do. Ord.	1	8	9	26/6	—	—
Elec. Dis. Yorkshire	1	9	9	42/6	—1/6	4 4 8
Elec. Fin. and Securities... ...	1	12½	12½	50/–	—	5 0 0
Elec. Supply Corporation ...	1	11	12	55/–	—	4 7 5
Lancs Light and Power	1	7½	7½	32/–	—	4 13 9
Lond. Assoc. Electric	1	—	7	30/9	—	4 11 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red. ...	Stock	5	5	105	—	4 15 3
Metropolitan	1	10	12	49/6	—	4 17 0
Midland Counties	1	7½	8	38/6	—	4 3 3
Mid. Elec. Power	1	8	9	40/9	—	4 8 3
North Eastern Electric Ordinary	1	7	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	32/6	—	4 6 2
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% pref.	10	6	6	13¾	–¼	4 7 3
North Met. Elec. Ordinary ...	1	10	10	47/6	–1/6	4 4 2
Do. do. 6% Pref.	1	6	6	29/6	—	4 1 4
Scottish Power	1	8	8	38/–	—	4 4 3
South London	1	7	7	31/6	—	4 9 0
Victoria Falls Ord.	1	12	13½	67/6	–3/6	4 0 0
Whitehall Elec. Invst. 7¼% Pref.	1	7½	7½	18/9	—	8 0 0
Yorkshire Elec.	1	8	8	41/–	–6d.	3 18 1
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	113	—	4 8 6
Do. 1955–75 ...	,,	5	5	115	—	4 7 0
Do. 1951–73 ...	,,	4½	4½	109	—	4 2 7
Do. 1963–93 ...	,,	3½	3½	100	—1	3 10 0
London Elec. Trans. Gtd. ...	,,	2½	2½	91	—1	2 14 4
London & Home Counties, 1955–75	,,	4½	4½	112½	—	4 0 0
London Passenger Transport, A...	,,	4½	4½	115½	–2	3 18 0
Do. do. B...	,,	5	5	119½	—	4 3 8
Do. do. C...	,,	4	4½	75	+½	5 13 4
West Midlands Joint Elec. 1948–68	,,	5	5	111	—	4 10 1
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	145½xd	–3½	6 3 8
Anglo-Am. Tel. Pref.	Stock	6	6	106	–1	5 13 1
Do. Def.	,,	1½	1½	24½	—½	6 2 5
Cable & Wireless 5½% Pref. ...	,,	4½	5½	88½	–5	6 4 4
Do. Ord.	,,	—	4	40	–4½	10 0 0
Do. Income	,,	—	—	101½	—½	3 18 8
Globe Tel. & Tel. Ord.	1	5½*	7½*	30/–	—	5 0 0
Do. do. Pref.	1	6	6	27/6	—	4 7 3
Great Northern Tel.	10	20	20	40	—	5 0 0
Marconi-Marine	1	10	7½	25/–	—	6 0 0
Oriental Telephone Ord.	1	12*	12*	57/6	—	4 3 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	5/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	5/–	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	10	—	—
British Electric Traction Def. Ord.	,,	5	5	875	–25	—
Do. do. Pref. Ord.	,,	8	8	170	—	4 14 2
Brazil Traction	$100	70 cts.	$1	11¼	–¼	—
Brit. Columbia Elec. Rly, Pce. ...	Stock	5	5	100	—	5 0 0
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. do. 1st Bonds	500	5	5	22½	–3	—
West Riding	1	6½	10	32/6	–	—
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1 11/16	+ 1/16	8 17 6
Assoc. Elec. Ord.	1	10	10	37/–	—	5 8 3
Do. Pref.	1	8	8	37/–	—	4 6 6
Babcock & Wilcox	1	10	10	36/3	—9d.	5 10 4
British Aluminium Ord.	1	10	12½	48/9	—	5 2 6
British Insulated Ord.	1	20	20	4¾	—⅛	4 11 4
Brush Ord....	5/–	Nil	Nil	5/3	—	—
Callender's...	1	20	20	4⅜	–⅛	4 6 7
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord. ...	5/–	12½	12½	26/3	+ 1/16	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	33/9	—	7 8 0
Enfield Cable Ord.	1	25	25	2⅝	—	—
English Electric	1	Nil	10	29/6	–6d.	6 15 7
Do. Do. Pref.	1	6½	6½	26/–	—	5 0 0
Ericsson Tel.	5/–	25	25	37/6	—	3 6 8
Ever Ready	5/–	45	35	18/–	—	9 14 6
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	17½	20	76/6	—	5 4 7
Henley's	5/–	15	20	20/–	—9 l.	5 0 0
Do. 4½% Pref....	1	4½	4½	22/6	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	38/3	—	6 11 0
Lancashire Dynamo	1	20	25	58/9	—	8 10 0
Siemens Ord.	1	7½	7½	23/3	—6d.	6 9 0
Telegraph Construction	£1	7½	10	2½	—	4 9 0

* Dividends are paid free of Income Tax.

New Patents

Electrical specifications recently published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 23, Southampton Buildings, London, W.C.2.

1936

25263. "Vacuum electric discharge tubes or valves." E. Y. Robinson, and Metropolitan-Vickers Electrical Co., Ltd., November 16th, 1936. (490511.)

31036. "Electrical high-frequency signalling systems." E. C. Cork, and J. L. Pawsey. November 13th, 1936. (490449.)

31196. "Method of heat treating hollow bodies from within and an electromagnetic induction heater therefor." H. E. Somes. November 21st, 1935. (Cognate applications 31197/36 and 31198/36.) (490514.)

31355. "Coin-freed telephone installations." F. Merk Telefonbau Akt.-Ges. November 14th, 1935. (490660.)

31558. "Operation of gas-filled electric discharge tubes containing luminescent materials." M. Servigne. November 18th, 1936. (490663.)

34301. "Electrical switchgear." British Thomson-Houston Co., Ltd., and H. Trencham. December 14th, 1936. (490518.)

1937

1016. "Electric switches operated by a breaking cover." J. Sax & Co., Ltd., and J. E. Abbott. January 13th, 1937. (490465.)

1060. "Television apparatus." Sir O. Stoll. January 13th, 1937. (490523.)

1080. "Braking mechanism." British Thomson-Houston Co., Ltd. January 18th, 1936. (490669.)

1143. "Thermionic-valve amplifier circuits." W. S. Percival. January 14th, 1937. (490525.)

3856. "Low-frequency amplifiers and the like." Pye Ltd., and M. V. Callender. February 9th, 1937. (490672.)

4177. "Voltage-regulating relays." Ferranti Ltd., E. D. T. Norris, and N. Newton. February 12th, 1937. (490527.)

4336. "Tuning systems for thermionic valve circuits." R. I. Kinross. February 13th, 1937. (490597.)

4359. "Method of and apparatus for the reception of radio signals." R. D. G. Mussett. February 13th, 1937. (490673.)

4518. "Telephone systems." Telephone Manufacturing Co., Ltd., J. G. Flint, and L. E. Ryall. February 15th, 1937. (490674.)

4538. "Electric remote transmission or repeating apparatus." Allgemeine Elektricitats-Ges. February 13th, 1936. (Addition to 487457.) (490675.)

4541. "Synchronising pulse separating circuits for television systems." Telefunken Ges. für Drahtlose Telegraphie. March 19th, 1936. (490676.)

4542. "Oscillation apparatus." Telefunken Ges. für Drahtlose Telegraphie. February 13th, 1936. (Cognate applications, 4543/37, 4544/37, 4545/37 and 4546/37.) (490529.)

4648. "Electron-discharge devises for use in television and like systems." Baird Television Ltd., and V. A. Jones. February 16th, 1937. (490533.)

4652. "Protective arrangements for electric cable systems." Okonite Co. February 28th, 1936. (490600.)

4770. "Teleprinter apparatus." Creed & Co., Ltd., and R. D. Salmon. February 17th, 1937. (490605.)

4833. "Manufacture of inductance-coil cores of finely-divided magnetic material provided with threads, collars, grooves or the like." Steatit-Magnesia Akt.-Ges. February 17th, 1936. (490679.)

4933/4. "Manufacture of alternating electric current rectifiers." A. L. Williams, L. E. Thompson, R. H. Cubitt, and Westinghouse Brake & Signal Co., Ltd. February 18th, 1937. (490682/3.)

4946. "Electric time switches." British Sangamo Co., Ltd., F. R. Butherus, G. Gilliver, and G. F. Tagg. February 18th, 1937. (Cognate application 28354/37.) (490812.)

4997. "Electro-dynamic devices for interconverting electrical oscillations and sound waves." L. Young, and A. Young. February 19th, 1937. (490750.)

5028. "Electrical apparatus having polystyrene as insulating material." Standard Telephones & Cables, Ltd., A. J. Warner, and A. A. New. February 19th, 1937. (490814.)

5034. "Printing-telegraph apparatus." Creed & Co., Ltd., and R. D. Salmon. February 19th, 1937. (490752.)

5075. "Insulated electrical conductors for generating heat." H. C. Harrison, and Durham Cables, Ltd. February 19th, 1937. (490546.)

5134. "Electric lighters for cigars and the like." C. Defries. (Casco Products Corporation.) February 20th, 1937. (490758.)

5153. "Electrical filter arrangements." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust, and J. D. Brailsford. February 20th, 1937. (490819.)

5166. "Light-sensitive control apparatus." Automatic Telephone & Electric Co., Ltd., and M. O. Williams. February 20th, 1937. (490759.)

5168. "Battery isolating switches suitable for the use with internal combustion engines." G. Robertson, and E. J. Rocher. February 20th, 1937. (490610.)

5177. "Television receivers." Telefunken Ges, für Drahtlose Telegraphie. February 20th, 1936. (490760.)

5219. "Electron-multiplying devices." Fernseh Akt.-Ges. February 20th, 1936. (490761.)

5270. "Electrical switching devices employed in electrical signalling systems." Automatic Telephone & Electric Co., Ltd., and P. N. Roseby. February 22nd, 1937. (490765.)

5287. "Manufacture of objects for electrical insulation and construction." A. Carpmael (I. G. Farbenindustrie Akt.-Ges.). February 22nd, 1937. (490688.)

5439. "Production of cuprous oxide rectifier elements." Siemens-Schuckertwerke Akt. Ges. February 26th, 1936. (490550.)

7684. "Phase-shifting networks." Marconi's Wireless Telegraph Co., Ltd. March 16th, 1936. (490553.)

13569. "Excitation of synchronous motors." G. A. Juhlin, and Metropolitan-Vickers Electrical Co., Ltd. May 13, 1937. (490563.)

15421. "High-frequency pentodes." M. O. Valve Co., Ltd., J. Bell, and D. A. Boyland. June 3rd, 1937. (490566.)

15734. "Means for producing electrical oscillations of square wave form." General Electric Co., Ltd., T. C. Skipper, and A. Steele. June 7th, 1937. (Addition to 428708.) (490622.)

18396. "Electrically heated domestic cooking stoves or ovens," Falk, Stadelman, & Co., Ltd., and W. H. Richardson. July 2nd, 1937. (490624.)

18653. "Radio-frequency control systems." Philco Radio & Television Corporation. July 31st, 1936. (490625.)

18792. "Ignition devices for electric-discharge devices having liquid cathodes." General Electric Co., Ltd. (Patent-Treuhand Ges. für Elektrische Glühlampen). July 6, 1937. (490478.)

20352. "Electric motors." British Thomson-Houston Co., Ltd. July 22nd, 1936. (490708.)

20814. "X-ray apparatus." O. C. Hartridge. July 27th, 1937. (490480.)

21058. "Electric testing and measuring apparatus." H. S. Walker and C. G. Mayo. July 29th, 1937. (490710.)

21692. "Electric heater." H. J. Osborn and H. J. Osborn & Sharp, Ltd. August 6th, 1937. (Cognate application 26338/37.) (490481.)

22038. "Resonance circuits stabilised by means of piezo-electric crystals." Fabbrica Italiana Magneti Marelli. August 11th, 1936. (490716.)

22219. "Electric-discharge tubes." C. Lorenz Akt.-Ges. August 18th, 1936. (490627.)

22223. "Production of electro-cardiograms and electro-cardiographs." H. E. Hollmann. August 12th, 1936. (Cognate application 22224/37.) (490717.)

22967. "Stems for electric lamps and the like." British Thomson-Houston Co., Ltd. August 22nd, 1936. (490628.)

24782. "Electric quick-acting switches with overload release, particularly socket automatic devices." Siemens-Schuckertwerke Akt.-Ges. September 11th, 1937. (Cognate applications 24783/37, 24784-37, 24785/37, 24786/37, 24787/37, 27487/37, 24788/37, and 24789/37.) (490721.)

27224. "Method for the manufacture of electric-discharge tubes with metal bulbs." Egyesult Izzolampa es Villamossagi R.T. October 7th, 1936. (490632.)

27618. "Flash-light lamps." Patent Treuhand-Ges. für Elektrische Glühlampen, W. Ledig, H. J. Helwig and M. Maetschke. October 11th, 1937. (490487.)

27639. "Testing arrangements for three-phase electric energy meters." Siemens & Halske Akt.-Ges. October 10th, 1936. (490633.)

28183. "Testing apparatus for comparing high-tension currents." R. J. Cunnell. October 16th, 1937. (490635.)

28881. "Electric motors." American Safety Razor Corporation. October 26th, 1936. (490723.)

29758. "High-pressure metallic-vapour lamp." Vereinigte Glühlampen und Elektrizitats Akt.-Ges. October 31st, 1936. (490577.)

31907. "Operating mechanism applicable, for example, to electric circuit-breakers." British Thomson-Houston Co., Ltd. November 19th, 1936. (490641.)

32040. "Method for the production of an electrical resistance." E. Huber Sen. November 20th, 1937. (490581.)

1938

957. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 14th, 1937. (Addition to 465030.) (490732.)

2295. "Electric frequency multipliers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 27th, 1937. (490649.)

2804. "Radio direction-finding systems." C. Lorenz Akt.-Ges. January 29th, 1937. (490650.)

3938. "Switch handles." British Thomson-Houston Co., Ltd. February 11th, 1937. (490589.)

4837. "Circuit for generating or amplifying high-frequency electric oscillations." Magyar Wolframlampa Gyar Kremenezky Janos Reszvenytarsasag. February 16th, 1937. 490500.)

5013. "Sound recording and reproducing apparatus, applicable to telephone systems." J. Soukup, F. Zerner, A. Holmes and W. H. Warman. February 18th, 1937. (Divided out of 4948/37.) (490825.)

5014. "Electrical pick-ups." J. Soukup, F. Zerner, A. Holmes and W. H. Warman. February 18, 1937. (Divided out of 4948/37.) (490826.)

5325. "Electric incandescent lamp, especially for air-raid precaution purposes." Egyesult Izzolampa es Villamossagi R.T. February 19th, 1937. (490736.)

5786. "Devices for measuring small electric capacities." Soc. Anon. Reo. March 3rd, 1937. (490651.)

6975. "Gas cookers and electric cookers." J. Webb, sen., J. Webb, jun., and S. Cooper. March 5th, 1938. (490502.)

9339. "Electric lampholders." Revo Electric Co., Ltd., and F. H. Reeves. March 26th, 1938. (Addition to 479669.) (490504.)

10819. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 22nd, 1936. (Divided out of 17151/37.) (490652.)

12078. "Broad band amplifiers." Hazeltine Corporation. May 11th, 1937. (490656.)

16909. "Arrangements for reducing arcing during switching of alternating currents." Siemens-Schuckertwerke Akt.-Ges. December 13th, 1935. (Divided out of 34289/36.) (490509.)

17211. "Voltage-regulating relays." Ferranti, Ltd., E. D. T. Norris, and N. Newton. February 12th, 1937. (Divided out of 490527.) (490593.)

21114. "Prepayment electricity meters." British Sangamo Co, Ltd., F. R. Butherus, and G. E. Weston. February 16th, 1937. (Divided out of 4683/37.) (Cognate application 21115/38.) (490827.)